Lucy E. Hoodley
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DIETETICS FOR NURSES

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DIETETICS FOR NURSES

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PREFACE TO FIRST EDITION

No other science has so much to do with the general welfare of mankind as the study of food and its effects in the human body. When we use the term "dietetics" as representing "the effect of the food in the human body," we do so in a very broad sense, for the subject is a big one, requiring comprehensive terms to express it.

The problems of nutrition are many. Food alone is no small subject and a still greater one is the utilization of food materials in such a way that the body may gain the greatest value with the least expenditure of vital forces. These problems are discussed in this text and the methods of overcoming them are given in the simplest possible language. For this purpose the subject of nutrition has been divided into groups: (1) a comprehensive study of the sources of food, its composition and nutritive value; (2) the effect of food in the body under normal conditions, as in health; and (3) its behavior and effect when conditions in the body become abnormal, as in disease. In this way much of the non-essential material is eliminated from the course of study and only that included which it is necessary for the nurse to understand and which she will constantly use both in the hospital and later on in the practice of her profession. The simple methods of study presented in this text are given with the idea of avoiding confusion in the mind of the average pupil nurse by fitting in the course with her other studies rather than by making it stand out as a separate subject. In this way she will be able to see at a glance the connection between the body processes and the materials which are used to carry them on. Thus her study of physiology, anatomy and bacteriology go hand in hand with that of dietetics, each bearing a distinct relationship to the others.

PREFACE TO FOURTH EDITION

The finger of science moves fast along the pathway of dietetic therapeutics, and passing, leaves a record to guide its followers to a simpler, and possibly, a better way to achieve health through dietary adjustment.

In this fourth edition of "Dietetics for Nurses," the author has made an effort to give to the study of dietetics a deeper and more significant meaning. To accomplish this purpose, the first section of the text has been reorganized and simplified; additional data has been included to cover the newer members of the vitamin family, and the study of the individual foodstuffs has been enlarged to include the metabolic processes through which the foodstuffs must pass, in order to be utilized by the body. The third section, "The Human Machine," is left in its place, and is used as a means for refreshing the memory of the nurse on the normal metabolic processes occurring within the organism before the study of dietotherapy begins. The author has found that this method of presenting the subject enables the nurse to grasp the significance of the changes necessarily made in the normal dietaries, to make them meet the needs of the patient, when disease has usurped the place of health.

The past few years have brought about some changes in the dietary management of some of the diseases that have long been treated by diet, and has added several new diseases to the list of those that have been successfully treated by means of dietary adjustment. The fourth edition included these changes and additions, through the kindness of the scientists who suggested them. The author

wishes to express her appreciation to Drs. Russell M. Wilder of the Mayo Clinic, and Dr. Otis Warr of the Polyclinic, Memphis, for their kindly criticisms and advice, and to Drs. Sansum and Blatherwick and Miss Ruth Bowden, Dr. George Minot, Dr. Harry Gauss and Dr. Henry Rudner for some of the new material included in the therapeutic section of this text. To Miss Mary Foley of the Mayo Clinic, and Miss Florence M. Smith of St. Mary's Hospital, Rochester, Minn., the author extends her thanks for the permission to include certain diets formulated by them, and used in the Mayo Clinic, and Hospitals.

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SECTION I

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CHAPTER I

FOOD

The value of a knowledge of food and its effect in the human body cannot be overestimated. In health, this knowledge leads to higher standards, since by pointing out the errors in one's mode of living, good health habits may be established, which will, undoubtedly assure the individual of a better nourished and a more vigorous body.

There is no question as to the value of health either from the standpoint of comfort or of economy. And the knowledge which will enable one to spread the good work intelligently cannot but raise the standards of living throughout the entire community.

In taking up the study of dietetics, the student is introduced to some of the fundamental principles governing the health and well-being of a people, since dietetics includes a study of food and its relation to the body.

The relationship between right food and good health is very close; how close is being demonstrated constantly in experimental fields of scientific research.

To be able to judge whether the food one eats daily is giving the best possible value from a physiological and economic standpoint, requires a definite knowledge of food, its source, composition and nutrient value, as well as its relation to the body in health and disease.

No one is capable of giving constructive advice upon matters pertaining to diet, unless he has acquired this knowledge through training. A nurse should obtain this training during her course in the hospital, through the class room, the wards and the diet kitchen.

The dividing line between health and disease is frequently almost imperceptible, and without a knowledge of the normal body, it is, at times, impossible to tell where the normal leaves off and the abnormal begins. For this reason a nurse must understand normal nutrition, that is, the behavior of food in the healthy body, before undertaking the task of ministering to the body attacked by disease.

In a text of this kind, it is impossible to cover all phases of the subject, especially since day by day new discoveries are being made with relation to food and its uses in the body. But with careful attention to the principles set forth, a nurse should be able to carry out the dietary orders given her by the physician and dietitian in the hospital. And, when her course of training is finished, she should find herself equipped to assist in raising the standard of health through her knowledge of dietetics. With this brief summary of the aims and object of the study of dietetics, we will begin the actual work with a study of Food.

Definition.—Food is the name given to any substance which, taken into the body, is capable of performing one or more of the following functions:

1. Building and repairing tissue, maintenance, growth, and development of the muscles, bones, nerves, and the blood.
2. Furnishing the energy for the internal and external work of the body.
3. Regulating the body processes, maintaining the proper alkalinity and acidity of the various fluids throughout the body, regulating the proper degree of temperature, and determining the osmotic pressure, etc.

Foodstuff.—All food material is made up from combinations of chemical elements under the group name "foodstuffs."

For the convenience of study scientists have arranged the foodstuffs in groups:

1. According to type;
2. According to their chemical composition;
3. According to the function they perform in the body.

All foods are composed of certain chemical elements; namely, carbon, oxygen, hydrogen, nitrogen, sulphur, phosphorus, iron, magnesium, potassium, chlorine, sodium, calcium, with traces of various others. The manner in which these elements are combined and the amounts in which they occur determine the group to which the combination belongs, and give to the foodstuff its characteristic position in human nutrition.

COMPOSITION AND CLASSIFICATION OF FOODSTUFFS

Organic Group		Inorganic Group	
Carbohydrates	Carbon Oxygen Hydrogen	Water . .	Hydrogen Oxygen
Fats . . .	Carbon Oxygen Hydrogen	Mineral Salts . . .	Phosphorus Iron Calcium Potassium Magnesium Sodium Chlorine Iodine Traces of others.
Protein . .	Carbon Oxygen Hydrogen Nitrogen Sulphur		

The sixth essential known as vitamins belong to the organic group but their exact chemical composition is not yet entirely determined. The known vitamins are: "A", "B", "C", "D", "E".

Each of the foodstuffs belonging to the organic group is capable of being burned in the body to produce heat for: (*a*) the maintenance of the body temperature; (*b*) internal and external work.

Neither water nor mineral salts alone can be burned to produce heat; nevertheless, they enter into the composition

and take part in every function performed by the carbohydrates, fats and proteins; therefore one foodstuff cannot be said to be of greater importance than another, since the needs of nature are best met by a judicious combination of all. However, the wear and tear of life can be more efficiently accounted for, and the strain upon the organism reduced more nearly to a minimum when the various foodstuffs are furnished in amounts which science is proving to be necessary for the health and well-being of the organism.

The sixth essential food substance, the Vitamins, together with the adjustment of the five foodstuffs just mentioned—the amounts and types of each in the dietary which will assure the body of the best results—has been, and still is a subject of grave interest. Even on the most perfect adjustment of these foodstuffs, the diet would fail to give the desired results without the inclusion of the sixth, or vitamin factor, which has proved to be essential for the growth and development of the normal body, as well as for its protection against certain deficiency diseases.

In order to obtain the best results from food, both from a health and an economic standpoint, it is necessary to become familiar with the foodstuffs as they are combined to make up the various common food materials. One foodstuff may be a producer of heat, but may lack certain chemical elements which are essential to the building of tissues; another may be able to accomplish both functions in the body, but will prove too expensive to use as fuel, except when it is absolutely necessary to do so. Thus, it is essential for the nurse to understand where and how both the foodstuffs and the vitamins occur in nature, in order to make use of them most advantageously. The following table gives the sources of the foodstuffs, after which a description of the individual foodstuffs and vitamin factors will serve to point the way to their use in the dietary:

Proteins	Milk, cheese (especially skim-milk cheese). Eggs. Meat (lean meat in particular). Poultry, game. Fish. Cereals, corn, wheat, rye, oats, etc. Bread and breadstuffs (crackers, pastry, macaroni, cake). Beans, peas, lentils. Cotton seed. Nuts. Gelatin.
Carbohydrates	Wheat products (bread, cake, crackers, pastry, macaroni, spaghetti). Cereal grains, breakfast foods. Corn products, corn meal, green corn. Rice, sago, tapioca, taro. Potatoes (white and sweet). Starchy fruits (bananas). Sweet fruits (oranges, grapes, pineapples). Dried fruits (prunes, dates, raisins, currants). Sugar cane, sorghum cane. Sugar beets, sugar maples. Products made from sugar (candy, jellies, preserves, marmalade).
Fats	Butter, cream cheese. Olive oil, cotton seed oil, peanut oil, corn oil, almond oil. Soy bean. Corn meal, cotton seed meal and flour, oatmeal. Pork (bacon especially), other fat meat. Codfish (and other fatty fish). Eggs (yolk). Cocoa, chocolate. Brazil nuts, almonds, pecans, and other nuts rich in fat.
Water	All foodstuffs except those which have been put through a drying process.
Mineral salts (organic form)	Nitrogen (in proteins, meat, eggs, milk, fish, gluten of wheat, zein of corn meal, legumen of beans, peas, and lentils). Phosphorus (eggs, yolk especially, cream, vegetables, whole wheat, cereals, breadstuffs, oatmeal, dried beans and peas).

Iron (organic and inorganic form)		Eggs, milk, lean meat, liver and other glandular organs, cereal products, whole wheat, dried beans and peas, vegetables, spinach in particular, onions, mishrooms, fruits, port wine.
Calcium (organic and inorganic form)		Milk.[1] Eggs. Soft tissues and fluids of all animals, skeleton and teeth of animals. Wheat (the entire grain), flour, oatmeal, polished rice. Dried beans and peas. Green vegetables (beets, carrots, parsnips, turnips, potatoes). Fruits (apples, bananas, oranges, pineapples, dried prunes). Nuts (almonds, peanuts, walnuts).
Sulphur (organic and inorganic form)	The proteins	Lean beef, eggs, milk. Wheat flour, entire wheat, crackers, etc. Oatmeal. Beans, peas. Potatoes.
Sodium, potassium, magnesium, iodine, chlorine		These elements are associated with the other mineral salts in foods, and a diet in which they are adequately supplied furnishes sufficient magnesium, potassium, chlorine, sodium, and iodine for the general needs of the body.
Vitamins		*Fat soluble "A."* Butter, cream, whole-milk. Whole-milk powder. Whole-milk cheese. Cod-liver oil, eggs. Brains, kidney. Cabbage (fresh-dried). Carrots, chard, lettuce. Spinach, sweet potatoes. *Water soluble "B."* Yeast (brewers'). Yeast cakes, yeast extract. Whole-milk, whey. Milk powder (whole and skimmed). Nuts, cereal (corn-embryo, wheat-embryo, wheat-kernel, rice (unpolished). Beans (kidney, navy, soy). Cotton seed, peanuts, bread.

[1] One quart of milk contains more calcium than a quart of clear saturated solution of lime water.

Vitamins . . . .

Cabbage, carrots, celery.
Cauliflower, onions
Parsnips, potatoes.
Peas (fresh), spinach.
Rutabaga, fruit, grapefruit.
Orange, lemon, tomato, raisins.

Water soluble "C."

Fruits: Orange, lemon, tomatoes (canned).
Tomato (fresh), grapefruit, limes, apples.
Vegetables: Spinach, lettuce, cabbage (raw).
Peas (fresh), onions, carrots, cauliflower.
Potatoes (to a less extent).
Whole-milk (to a less extent).

Fat soluble "D."

Cod-liver oil.
Egg yolk.
Whole milk.
Butter fat.
Green vegetables.

THE INDIVIDUAL FOODSTUFFS AND VITAMIN FACTORS

A study of the individual foodstuffs and vitamins will furnish the first link in the chain which constitutes our present knowledge of dietetics.

STUDY OF INDIVIDUAL FOODSTUFFS

CARBOHYDRATES

Definition.—Carbohydrates may be defined as "Simple sugars," or substances which can be reduced to simple sugars by hydrolysis.

Source.—Plant life furnishes the greater portion of carbohydrates used as food, the cereal grains, sugar cane, sugar beet, sugar maple, and sweet fruits as well as vegetables (tubers particularly), being the most available sources; Milk (lactose) Blood (glucose), and Liver (glycogen) furnishing the only carbohydrates in animal form.

Classification.—Carbohydrates are classified as Monosaccharides, or "Single sugars"; Disaccharides, or "Double sugars"; and Polysaccharides, or "Complex sugars."

Single Sugars (first group); made up of three members,

the chief of which is *glucose*, the others are fructose and galactose.

Double Sugars (second group); made up of three members, all of which are important, Maltose; Lactose (sugar of milk), Sucrose (cane sugar).

The third group, known as complex sugars or Polysaccharides, is made up of *"Starch," "Cellulose"* and *"Glycogen."*

Starch represents the form in which plants store carbohydrates.

Cellulose represents the skeletal part of plants (the fibers, skin, stems, leaves).

Glycogen represents the form in which the animal body stores carbohydrates temporarily.

Organic Acids.—Certain of the carbohydrate foods (fruits and green vegetables) contain appreciable amounts of organic acids or their salts; oranges and lemons, for example, are rich in citric acid; grapes contain considerable quantities of potassium acid tartrate, apples and other fruits have malic acid; many of the fruits have succinic acid; a few foods contain oxalic acid, or oxalates. All of these organic acids are burned in the body to produce energy, with the possible exception of the oxalates, which seem to have little, if any, food value. According to Sherman, these organic acids have a lower fuel value, per gram, than carbohydrates, but are reckoned as such in computing a food in which they exist. The function of these substances is chiefly that of neutralizing the acids formed in the body in metabolism. Being base forming in character, they function after absorption and oxidation in the body as potential bases—the base associated with the acid in their ash combining with carbonic acid to form carbonates, which act as above described.

Function of the Carbohydrates.—The chief function of the carbohydrates is to furnish fuel material for the produc-

tion of heat to carry on the internal and external work of the body; but certain of the carbohydrates (glucose and the organic acids found in fruits in particular) act as neutralizing agents, thus function as body regulators; glucose in the blood helps to protect the body against the action of harmful bacteria. As *glycogen,* the carbohydrates are stored in the liver and to a less extent in the muscles, in this form they act as fuel reserve, from one meal to the next, being readily changed into glucose by enzymes in the liver and the muscles when more fuel is needed; as *cellulose* the woody fiber of plants, they lend bulk to the food mass in the intestines furnishing a mechanical stimuli which facilitates the movement of the mass down the intestinal tract.

Digestion of Carbohydrates.—In order to be used by the body, the carbohydrates like other foodstuffs require to be changed (for the most part) to simpler substances. These changes occur as the result of enzymes in the saliva, the pancreatic juice and the intestinal juice. Starch and double sugars must be changed to single sugars, "glucose, fructose or galactose," before they can pass through the intestinal walls.

Starch is acted upon by the amylase ptyalin in the saliva and amylopsin in the pancreatic juice and changed to maltose. The double sugars, maltose, lactose, and sucrose, are acted upon by the enzyme "maltase," "lactase" and "sucrase," in the intestinal juice and changed; maltose is changed to glucose; lactose (milk sugar) is changed to glucose and galactose; and sucrose (cane sugar) is changed to glucose and fructose. The first group, glucose in particular, being already in the form of single sugars are ready to be absorbed as soon as they reach the small intestine.

Absorption of Carbohydrates.—Glucose and other members of the first group of carbohydrates are taken up by the capillaries lining the walls of the small intestines and passed on to the portal vein and from there into the liver where

it is stored as glycogen (the muscles store glycogen to a less extent also). The glycogen is converted into glucose gradually and given to the blood as needed for fuel. The glucose in the portal blood after a meal rich in carbohydrates may be very high but the blood in general circulation carries an almost constant glucose content, of about one-tenth of one per cent.

Metabolism of the Carbohydrates.—The use of glucose as fuel by the body is dependent upon (or is believed to be) a substance known as insulin, secreted by certain cells in the pancreas. This substance is thought to be responsible for the arrangement of the glucose in forms that are easy for the body to use as fuel, temporary fuel (glycogen) or as fat (future fuel); the glucose used as fuel is acted upon by certain enzymes which makes it more easily oxidized, when the process has been completed, and there is no more material available from the glucose that has been burned. The substances that remain (end products of carbohydrate metabolism) leave the body as carbon dioxide and water, by way of the kidneys (urine), the skin and the lungs.

The Effect of Heat on Carbohydrates.—Heat has no apparent chemical effect upon simple sugars. All simple sugars are soluble in hot and cold water.

On starch the application of heat in the presence of moisture has the effect of (1) softening the cellulose inclosing the starch grain and allowing it to come more easily into contact with the digestive enzymes; (2) continued heat in the presence of moisture renders the starch more soluble (starch paste) and possibly more easily digested. Dry heat dextrinizes the starch. The best example of this can be seen in toast.

Bacterial Action upon Carbohydrates.—The bacteria that act upon the carbohydrates are chiefly of the fermentative type; the sugars are more sensitive to bacterial action in the stomach. This is particularly true in cases of achylia

(hypoacidity) in the stomach. Starchy foods under certain conditions ferment in the small intestine giving rise to an irritation of the mucous membranes which lead to a type of diarrhea known as "fermentative diarrhea." This action on starch is emphasized in the presence of cellulose.

FATS

Definition.—Fats may be defined as glycerides, or combinations of fatty acids and glycerol. The fatty acids may vary both in type and number in a typical fat, but the base with which they combine is always glycerol (glycerine).

Composition.—Fats, like the carbohydrates, are composed of carbon, oxygen and hydrogen, but fat contains less oxygen and more carbon and hydrogen than the carbohydrates and represent a more compact as well as a lighter and more concentrated form of fuel for storage purposes.

Classification.—Fats are classified as: (1) true fats and (2) volatile oils. The true fats represent the type chiefly found in food; the volatile oils, useful to a small extent, dietetically, as flavoring extracts.

Typical Fats.—Fats are derived from both animal and plant life. A few of the typical animal fats being: Lard, from pork; suet and oleo, from beef; tallow, from mutton; butterfat, from milk; lecithin, a phosphorus bearing fat characteristic of brain and nerve tissue; cholesterol, from egg yolk, blood and other tissues. The typical fats of vegetable origin are olive oil, cotton seed oil, corn oil, cocoa butter from cocoa bean (chocolate and cocoa), cocoanut oil, almond oil, peanut oil.

Characteristics of Fats.—The fats are all insoluble in water, and only partially so in cold alcohol, but they dissolve readily in ether. As a rule, the fat occurring in the animal body is more or less characteristic of the species. For example, animals that live on land have a harder fat than those living in the water; warm blooded animals,

harder fats than cold blooded ones (fish); and carnivorous animals, harder fats than herbivorous species.

Fats are lighter than water, hence will float in it. An emulsion is a suspension of fat in a fluid, and the fat in this case must be very finely divided and mixed with some other material which will prevent a coalescence of the fat globules. In milk, which is one of the best natural emulsions, the additional substance is protein.

Function of Fat.—Fat represents the most concentrated form of fuel for the production of energy and probably the ultimate form in which the body stores fuel for future use. As adipose tissue, fat acts to conserve body heat and surrounding the vital organs protects them from shocks and jars.

As neutral fat in the tissues, fat assists in sparing body proteins; as lecithin, it serves as a valuable source of phosphorous, taking active part in all cell structure; as cholesterol, present in practically all active tissues and in blood, it is believed to be concerned in the metabolism of the fatty acids, and in this form it is likewise valuable as a source of "D" vitamin, which is believed to be formed as a result of the direct rays of the sun upon the cholesterol in the skin.

Fats are more or less interchangeable with the carbohydrates as a source of energy, and diets low in protein may be made adequate, from an energy standpoint, if sufficient calories are obtained from fats and carbohydrates to cover the needs of the individual for whom the diets is required.

Dietetic Use of Fat.—To furnish heat to carry on the internal and external work of the body; (2) to spare the body proteins as used in the typical "high calorie diets" for typhoid fever and other disturbances accompanied by considerable tissue waste; (3) to lessen the work of elimination of carbon dioxide on the part of the lungs while furnishing a maximum number of heat units, as in the

diets for tuberculosis; (4) as means for inducing ketosis (acidosis) in the treatment of epilepsy; (5) as inhibitory agents in the secretion of hydrochloric acid in disturbances of the gastric organ accompanied by hyperchlohydria as in gastric ulceration; (6) as carriers of the A and D vitamins.

Digestion of Fats.—No digestion of fat occurs in the mouth, little digestion of fat occurs in the stomach (some small changes may take place in the finely divided or emulsified fats), but the greater part of the digestion of fat occurs in the small intestines as a result of the fat splitting enzyme or lipase, "steapsin" found in the pancreatic juice. Steapsin splits fat to fatty acids and glycerol.

Glycerol is soluble in water and is absorbed with that liquid through the intestinal walls. Fatty acids are insoluble in water but readily dissolved in the liver secretion "bile," forming soaps in which form they are absorbed; the fatty acids and glycerine recombine as neutral fats on their passage through the walls of the intestines.

Metabolism of Fats.—The neutral fats in passing through the walls of the intestines are taken up by the lymph vessels rather than the capillaries and poured in the blood with the lymph. On leaving the blood the fats are used either for immediate fuel, or are stored until needed for future fuel.

The oxidation of the glycerol part of fats is similar to that of the carbohydrates, being finally reduced to the same end products, carbon dioxide and water, and leaving the body by the same channels, the lungs, skin and kidneys. The oxidation of the fatty acids, however, is not so simple a process, and depends more or less upon the proportionate amount of glucose present and available, and the way in which the body is utilizing these substances. Normally the fatty acids burn completely to carbon dioxide and water, but when the amount of glucose necessary to complete their oxidation is not available, as occurs in certain starvation

cases and in diabetes, the fatty acids form intermediate products known as ketone or acetone bodies. These substances, diacetic acid, β-oxybutyric acid and acetone, are toxic in character and any accumulation of them in the body will lead to a condition known as ketosis, or acidosis, which may or may not end in death.

Effect of Heat upon Fat.—When fats are brought to a high temperature, the glycerine which they contain decomposes with the production of a substance known as acrolein, which has an irritating effect upon the mucous membranes. It is possible that the over-heated fatty acids add their quota to the production of irritating fumes. As a rule, it is inadvisable to use frying as a method of preparing food for the sick or for children. Doubtless, if every cook understood the exact degree of heat to apply in frying, and knew just how moist to have the food mixture which she intended to cook in this manner, better results would be obtained; but since the average cook knows little about the scientific application of heat to fat or the changes brought about thereby, it is safer to make use of other methods of food preparation under the circumstances.

PROTEINS

Definition.—Proteins may be defined as a group of different but closely related organic substances containing nitrogen.

Composition.—All proteins are composed of carbon, hydrogen, oxygen, nitrogen and sulphur. Some contain phosphorus and iron also.

Structure of Protein.—Proteins are built from eighteen or more amino acids. These acids serve as building stones some of which are absolutely essential for the maintenance of life, others are necessary for growth and development. If in selecting the food only one protein food is available, let that one be a type containing all of the essential

building stones, not only for maintenance but for growth as well.

Classification.—Proteins may be classified as: Simple, conjugated, and derived proteins. Simple proteins;—A few of the simple proteins with which we are concerned are: *Albumins,* found in egg white (especially), milk, and blood. This form of protein is soluble in cold water and coagulated by heat.

Globulins: as myosin (muscles), febrin, fibrinogen.

Albuminoids: keratin, elastin, and collagen tendons, connective tissues, etc. Gelatin one of the best examples.

Conjugated Proteins.—Mucin and mucoids phospho-proteins, such as casein, the insoluble protein of milk; vitellin, of egg yolk; nucleo-protein, the protein of which the cell nuclei is composed; purins, which occur as free purins in food and the body and as a product of metabolism of nucleo proteins in the body; hemoglobin, the protein of which the red blood cells are chiefly composed; lecithin, a phosphorus bearing protein characteristic of brain and nerve tissue.

Derived Proteins.—Products of digestion such as acid or meta-proteins, proteosis, peptones, peptids, and amino acids.

Source.—Proteins occur in both animal and plant life, but those derived from animal sources, such as meat, milk, eggs, contain more of the essential building stones (amino acids), than the proteins derived from plant life, such as beans and grains. Gelatin, although derived from animals, lacks two of the most important amino acids and cannot be used as a sole source of body protein. It is, however, a valuable supplementary protein in the feeding of adults and children.

Characteristics of Typical Proteins.—Simple proteins are coagulated by heat. Albumins are soluble in cold water or salt solution, but coagulate in hot water. Dry heat coagulates protein and excess heat toughens it and makes it slower

of digestion. Gelatin swells in cold water and dissolves in hot water.

Selection of Protein Foods.—Milk is considered to furnish the best type of protein for both maintenance and growth, eggs likewise contain all of the essential amino acids for maintenance and growth, meat furnishes a good quality of protein; grains (cereals) contain the essential building stones but as a rule in insufficient amounts consequently should be supplemented especially in the diet of children; milk is the best known supplementary food; beans (legumes) other than string beans and green peas must be supplemented in order to furnish material for growth; bean protein is not considered as good a type of building material as either meat, eggs or cereals.

Function of Protein.—Build and repair tissue and furnish material for growth; (*b*) stimulate heat production by the tissues; (*c*) a good, but expensive form of energy; (*d*) proteins are known to influence the metabolic rate in the body; this property of protein foods is recognized and made use of in certain types of obesity diets. Hemoglobin, while serving as a carrier of oxygen to the tissues is likewise taking an active part in the removal of carbonic acid produced in the tissues.

Digestion of Proteins.—No digestion of protein takes place in the mouth, there being no protein splitting enzymes in salivary juices.

Gastric Digestion.—Gastric juice contains two protein splitting enzymes in addition to the hydrochloric acid, water, etc. These are: renin, which acts upon the protein of milk (clotting); and pepsin, which acts upon all proteins splitting them to proteosis and peptones. The action of enzymes in the stomach depends upon the hydrochloric acid in the gastric juice.

Intestinal Digestion.—Two secretions contain enzymes for the splitting of the proteins in the intestinal tract: (1) the pancreatic juice, containing the enzyme tryspin which

changes proteins to *proteoses, peptones, polypeptids* and *amino acids* and (2) intestinal juice containing the enzyme "erepsin," which continues the work of the tryspin changing the peptones to *amino acids and ammonia,* in which form the proteins of food are absorbed.

Absorption of Amino Acids.—Amino acids are absorbed by way of the capillary vessels lining the intestinal walls. From there they are carried to the portal blood, unchanged, and on through the liver into the general circulation.

Metabolism of Proteins.—The proteins are absorbed and distributed in the form of amino acids, these acids are used by the tissues for the building up of body protein, the disappearance of the amino acids from the tissues is said to be due either to the building up into protein, or a breaking down with the formation of ammonia and urea or both. It is believed that all tissues have the power to build up their own particular type of cells from the incoming amino acids, and likewise take part in breaking down the amino acids with the formation of urea and ammonia. The greater part of the urea is formed in the liver. This is believed to be on account of the activity of the liver tissues in breaking down the amino acids.

The end products of protein metabolism are: *Urea,* as a rule in normal conditions from 82 to 88 per cent of the nitrogen eliminated is in this form.

Ammonia, normally formed before urea, being changed into that product, in part in the muscles and in other tissues generally, and in part in its passage through the liver.

Uric Acid and Purin Bases, part of the nitrogen excreted in the urine is always in the form of uric acid and purin bases. These substances owe their presence either to the free purin substances in food (see meat extract), or to the metabolism of the nucleo proteins of food or of the body tissues.

Creatinin. This substance is excreted in fairly constant amounts averaging about 0.02 grams per kilogram of body

weight. This represents approximately 3 to 7 per cent of the total nitrogen in urine.

Elimination of Protein End Products.—The greater part of the end products of the protein metabolism (both of food and of the body) are eliminated by way of the kidneys.

WATER

Man can exist for days, even weeks, without food, but without water life soon becomes extinct. This substance is composed of hydrogen and oxygen in the proportion of two to one; that is, to each atom of oxygen there will be found two atoms of hydrogen. This is always the case no matter where it is found. When foods are put through a drying process the water is taken out and the rest of the chemical composition of the food remains unchanged.

This foodstuff, unlike those belonging to the organic group, is not changed during the process of digestion, nor does the application of heat or cold affect it, save from a physical standpoint. Water boils at a temperature of 100° C. (212° F.), and freezes at a temperature of 0° C. (32° F.).

Function of Water.—The uses of water in the body are many, and the advantage arising from a sufficient amount of this foodstuff in the dietary cannot be overestimated. It is no longer considered an error in diet to drink a moderate amount of water with the meals, so long as it is not used as a substitute for mastication, and as a means of washing the food into the stomach. In the diet, both as a beverage and as a part of most of the food materials ingested, water serves to moisten the tissues; to furnish the fluid medium for all of the secretions and excretions of the body; to carry food materials in solution to all parts of the organism; to stimulate secretory cells producing the digestive juices, thereby aiding in the processes of digestion, absorption and excretion; to promote circulation; to fur-

nish material for free diuresis, thus preventing to a great extent the retention of injurious substances by the body, which might otherwise take place.

Factors Determining the Amount of Water Needed.—In normal conditions it is probable that the kind and amount of exercise taken has more to do with the amount of water needed by the body than any other factor, since the vigorously worked body excretes more water by way of the skin than the quiescent one. With a normal amount of exercise, it is advisable to drink from six to eight glasses of water each day, increasing the amount to a certain extent when exercise causes a great loss through perspiration. It is always advisable, however, to keep in mind that an excessive amount of fluid taken into the body throws a corresponding amount of work on the organs (the stomach, kidneys and heart). In certain abnormal conditions, the body's water supply is depleted. This is particularly true in the case of hemorrhage, vomiting, and diarrhea. Under other conditions (certain types of nephritis), the body becomes overburdened through the excess of water retained, owing to the difficulty which the kidneys show in eliminating it. This retention of water by the tissues gives rise to the condition known as edema.

MINERAL SALTS

Ash.—The eight remaining chemical elements, *i.e.*, calcium, magnesium, sulphur, iron, sodium, potassium, phosphorus, chlorine, constituting the mineral salts or ash, are likewise classed as food on account of the work which they perform in the body. Some of these elements enter the body as essential constituents of the organic compounds, and are metabolized in the body as such, becoming inorganic only upon oxidation of the organic materials of which they form a part.

Importance of the Mineral Salts.—The way in which the

mineral elements exist in the body and take part in its functions, has been graphically outlined by Sherman as follows:

"(1) As bone constituents, giving rigidity and relative permanence to the skeletal tissues. (2) As essential elements of the organic compounds which are the chief solids of the soft tissues (muscles, blood cells, etc.). (3) As soluble salts (electrolytes) held in solution in the fluids of the body; giving to those fluids their characteristic influence upon the elasticity and irritability of muscle and nerve; supplying material for the acidity and alkalinity of the digestive juices and other secretions; and yet maintaining the neutrality, or slight alkalescence, of the internal fluids as well as their osmotic pressure and solvent power." [2]

The above outline, showing the various ways in which the mineral constituents enter and take part in the various functions, as well as in the structure of the body, make it evident that the same close attention and study which was given to the other foodstuffs must be accorded to these substances. When the student realizes that the presence of certain salts dissolved in the blood assists in the regulation of the vital processes of the body such as the digestion, circulation and respiration; that they are responsible for the contraction and relaxation of the muscles; that they assist in controlling the nerves; that they are, in a way, instrumental in releasing the energy locked up in food—the value of these elements becomes very evident, and their importance in the dietary inestimable. Some of the mineral salts are more widely distributed in food than others, and the danger arising from their deficiency in the diet is not so great as is the case with others; hence attention is called to those found by investigators to be most often lacking or deficient in the average diet; *i.e.*, calcium, phosphorus, and iron.

[2] "Chemistry of Food and Nutrition" (3rd Ed.), p. 267, by Henry Sherman.

Importance of Typical Mineral Salts.—Of the eight minerals that exist in appreciable amounts in the body and in food, the ones most likely to be deficient in the average dietary are: Calcium, phosphorus, iron and iodine. Calcium and phosphorus can be efficiently furnished by milk, cereal grains contain appreciable amounts of calcium, but recent feeding experiments with children proved the calcium from milk to be used to better advantage than that obtained from grains and other sources; and that diets lacking in milk would be likely to bring about a calcium deficiency in the child to whom it was fed.

Iron.—Iron is found in egg yolk, meat (especially liver and other organs), spinach and other green vegetables, carrots, potatoes and beans, and also in the whole cereal grains (Mellins food, a prepared cereal product contains 1 milligram of iron in each tablespoonful).

Iodine.—The only source of iodine to any extent is sea water, but sea foods and drinking water that has passed through soil impregnated with iodine furnish certain amounts. It has been found that regions far from the sea are likely to show a prevalence of simple goiter, a disease characterized by a deficiency of iodine.

Functions of Special Salts.—Calcium is important in regulating the contraction and relaxation of the heart and other involuntary muscles, is essential for the normal coagulation of the blood, is essential for the building and strength of bones and teeth, as well as for the maintenance of normal nutrition.

Phosphorus.—Like calcium is essential to growth and development; is an essential constituent of every living cell; helps to control enzymic action and maintain normal neutrality in the body.

Iron.—Iron stands in the closest possible relation to the fundamental processes of nutrition, being an essential element both of the oxygen-carrying hemoglobin of the blood and of the chromatin substances which appear to control

(in some degree at least) the most important and "vital" activities within the cells. Iron is likewise believed to play an important part in making the energy of food available to the body. Diets deficient in iron are likely to bring about conditions of anemia more or less serious in character.

Metabolism of Mineral Salts.—Sulphur enters the body chiefly in combination with the proteins and is metabolized with that foodstuff. When the proteins or their products are oxidized the sulphur becomes converted into sulphuric acid, this acid is highly destructive and must be neutralized as soon as it is formed. The greater part of the sulphuric acid formed leaves the body as inorganic sulphates, by way of the urine; the lesser part in combination with some organic material to form ethereal sulphates (the best known of which is indican; this substance is formed as a result of bacterial action upon unabsorbed protein).

Phosphorus.—Nearly all of the phosphorus leaves the body in an inorganic form, as inorganic phosphates.

Calcium.—This mineral salt, upon absorption, is carried through the digestive and metabolic processes and leaves the body chiefly by way of the intestines (in the feces), very little of the calcium ingested leaves the normal body in the urine.

Iron.—The greater part of the iron present in the body is believed to exist in the form of actively functioning substances; namely as hemoglobin, very little being stored, and leaves the body by way of the kidneys and in the feces. When the intake of iron is less than the output a condition known as anemia will develop, due to a lessening of the hemoglobin being built.

VITAMINS

Vitamins are substances existing in foods (and in sunshine) which are absolutely essential to life.

Type.—There are five known vitamins and probably

many more yet undiscovered. Those that are known to function in nutrition are: "A," antiophthalmic, since it prevents and cures an eye disease known as xerophthalmia; "B," antineuritic, preventing and curing a nerve disease common to the Orient, known as beri-beri; "C," antiscorbutic, preventing and curing scurvy; "D," antirachitic, preventing rickets; "E," antisterility, essential to normal functioning of the reproductive organs.

Function of "Fat Soluble A."—All investigators agree that the "A" vitamin is an essential factor in the growth of young tissue, and the repair of mature tissues. McCollum claims that this vitamin is likewise a factor in the prevention of the eye disease known as xerophthalmia, and other scientists also hold this opinion. Eddy states that a diet lacking in the "A" vitamin will, in the majority of cases, result in stunted growth and the development of the eye disease, and that the appearance of the latter may be taken as a sure indication of the absence or deficiency of this vitamin.

Recent studies made on the "A" vitamin and its relation to health and nutrition disclosed the fact that diets poor in this dietary essential not only increased the individual's susceptibility to eye disease, but to many other infectious diseases. That a deficiency in the "A" vitamin is likely to effect the appetite, the digestion, the lungs, the sinuses, the ear, the air passages, the bladder and the skin.

Storage of Vitamin "A" in the Body.—The body seems to have the ability to store the "A" vitamin in certain quantities. It is to this storage that young animals owe their continued growth for a period even on diets that are poor in "A" vitamin. This constitutes an important evidence of the need for careful adjustment of diets for pregnant and lactating women. There is no doubt as to the constant need for an abundance of foods rich in the "A" vitamin, since its effect upon health, vigor and nutrition has been so

definitely proved. Recent studies made upon laboratory animals proved that the body stores the "A" vitamin better than it does either the "B" or the "C" vitamin.

Effect or Heat on the "A" Vitamin.—Heat, as applied in the ordinary methods of cooking, is not believed to exert a great deal of destruction upon the "A" type of vitamin; but hydrogenation, the process used in the hardening of certain fats in the manufacture of lard substitutes, is said to destroy it completely.

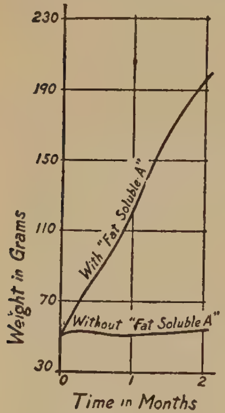


Figure showing the effect upon growth of adding "fat soluble A" to a diet adequate in all other respects. Courtesy of Dr. E. V. McCollum.

"Water Soluble B."—The second vitamin discovered in milk and believed to be identical with the Funk vitamin is more widely distributed than the "A" vitamin. For this reason it is not so likely to be deficient in the diet as is found to be the case with the "A." A glance at the table shows that the best sources outside of yeast are the seeds of plants, in milk and in eggs. In beans and peas the "B" vitamin is distributed throughout the entire seed, but in the cereal grains it is found chiefly in the embryo. As a result, bread made from fine white flour or meal is much more apt to be deficient in vitamin of the "B" type than that which is made from the whole grain; the same is true of rice and other cereals. Spinach, potatoes, carrots and turnips show an appreciable amount of the vitamin, but beets are known to be extremely poor in it. Nuts, too, are considered a valuable source.

Function of the "B" Vitamin.—Like the "A" vitamin, water soluble "B" is believed to be essential to growth. Funk established its value as a preventive and cure of Beriberi, the disease common in the Orient among people living

largely upon a diet of polished rice and fish. Besides being a growth-stimulating substance and an antineuritic, the "B" vitamin is highly valued for its stimulating effect upon the appetite. There is much evidence to show that an adequate amount of vitamin B is essential to the proper functioning of the digestive tract; that serious impairment in the digestion, as well as an intestinal stasis, due to diminished neuro-muscular control of the intestine (McCarrison) may result from such a deficiency. At times milk formulas need to be supplemented with food rich in vitamin B.[3]

Effect of Heat on the "B" Vitamin.—This vitamin also shows a resistance to heat; that is, as applied in the methods generally used in cooking, pasteurization temperatures do not materially affect the vitamin property of the formula as far as the "A" and "B" factors are concerned.

The Effect of Alkali (Soda) upon the "B" Vitamin.—It has been an ordinary practice to add soda to the water in which certain vegetables are cooked, for the ostensible purpose of softening the vegetables and hastening their cooking. This practice has been condemned by many scientists who are making experiments along these lines, on account of its destructive power upon the "B" vitamin. Chick and Hume in England claim that when the amount of food given contains originally just sufficient vitamins to cover the growth factor the use of soda in the cooking water does serious harm to these vitamins. This is a point well worth remembering. It is often difficult to persuade certain individuals to eat vegetables in appreciable quantities; if the vitamins were reduced through the method of preparing the food, these individuals would not obtain a sufficient quantity of the vitamins.

"Water Soluble C."—The third member of the vitamin family is known for its antiscorbutic property; that is, it

[3] Milk from cows whose diet has been deficient in vitamins shows a like deficiency in vitamin content—the same is true of mother's milk.

is the best known cure and preventive of scurvy. It likewise exerts a certain amount of influence upon the growth of the animal and must be present in the diet, in order that the health and well-being of the individual may be safeguarded. The "C" vitamin, like the "B" vitamin, is soluble in water, and is present to an appreciable extent in the fresh juices of the fruits and vegetables. Some are richer in this respect than others (orange and tomato juice), while the cereals, grains, seed of plants, sugars, oils, and meats are singularly deficient. Milk (whole) does not contain a great amount of the "C" vitamin, and this amount is still further reduced under certain methods of preparation. Milk powders, made either from the whole or the skimmed milk, are found to contain only very small amounts of this essential substance. Condensed milk and cream are supposed to be free of "C," and the same is true of eggs.

Effect of Heat on "C" Vitamin.—All authorities agree that the "C" vitamin is much more sensitive to heat than the other two; and for this reason much of the value obtained from this vitamin in uncooked material may be lost when the food containing it is subjected to long continued heat. Hess claims that the temperature used for pasteurizing milk for some time, is more destructive to this vitamin than boiling water temperature continued for a few minutes only.[4] There is need for care in formulating the diet for children to see that they are given fresh fruit every day; or when that is not possible, to see that they are at least given tomato juice. This substance is rich in the antiscorbutic vitamin, and according to experiments made by Sherman, LeMer and Campbell, loses fifty per cent of its antiscorbutic power when boiled one hour. Dr. Delf at the Lister Institute experimented with raw and cooked cabbage, and found that when this material was cooked for one hour at temperatures ranging from 80° to 90° C the

[4] "The Vitamin Manual," p. 64, by Walter H. Eddy.

loss in antiscorbutic power amounted to 90% in the cooked leaves over the raw material. Dr. Delf also concluded from her experiments that it was advisable to add neither acid nor alkali in the cooking of vegetables if these substances were to give their maximum value of vitamins.

"D" Vitamin.—Known as the Antirachitic vitamin on account of its power to protect the body against the development of the disease Rickets.

This dietary essential, like "A" is soluble in fats and is more or less associated with that vitamin in codliver oil, egg yolk and whole milk.

Source.—The most important source of the "D" vitamin is codliver oil, but egg yolk has recently been found to furnish an abundance of "D" and can be used readily in the diet of young children. Butter fat, whole milk and green vegetables have likewise been established as good sources for the "D" vitamin. Sherman writes: "Whole milk has an important antirachitic value. Its value for the prevention of rickets is doubtless due in part to the considerable amount of antirachitic vitamin which it contains when it is produced and handled under favorable conditions, and in part to the fact that it contains liberal and well-balanced proportions of calcium and phosphorus."

Function.—Prevents rickets and improves the calcium balance in babies (Steenbock and Daniels); improves the calcium balance in healthy young women on a low calcium diet (Bogert, *et al.*); improves the calcium balance in lactating animals whose large output of milk makes calcium equilibrium difficult even with a liberal amount offered in food (Hart, Steenbock, *et al.*). The "D" vitamin has the effect of conserving the body calcium and regulating mineral metabolism and therefore cannot be judged other than essential to life.

Formation of the "D" Vitamin.—The formation of the "D" vitamin is believed to occur as a result of the direct

rays of the sun upon the cholesterol in the skin (a like formation is brought about by subjecting the body to the ultra violet rays from a mercury vapor quartz lamp. If the sunshine passes through window glass the ultra violet rays are strained out, thus depriving it of its antirachitic value.

Effect of Heat.—The "D" vitamin is not believed to be effected by heat as applied in ordinary cooking processes.

"E" Vitamin.—Known as the antisterility vitamin, because it exerts a definite effect upon the reproductive functions in animals. At present it is not believed to be of great importance in the human diets. According to Sherman, "Failures in reproduction encountered in actual experience are apt to be due to a shortage of some other factor, such as Vitamin 'A.'"

Source.—The vitamin is wildely distributed in natural foods: seeds, green leaves, wheat embryo, most of the vegetable oils, milk (whole), whole-milk powder and to a less extent in butter fat. The amount required to cure or prevent a certain type of sterility in animals is very small, every bit that exists in food can be utilized by the animal as a protection against this type of sterility.

Effect of Heat, Air, Light.—The "E" vitamin has proved to be impervious to heat, air and light.

CHAPTER II

THE FUEL VALUE OF FOOD

SCIENCE has proved that the human body is composed of certain chemical elements and that food materials are combinations of like elements; it has likewise proved that the body will utilize her own structure for fuel to carry on the work of her various functions unless material is supplied for this purpose from an outside source, namely, food, which in chemical composition so closely resembles that of the human body.

Amount and Type of Food.—The next point of investigation would logically be the amount and kind of food necessary to best accomplish this purpose. To be able to do this it was necessary to have some standard unit by which to measure the amount of heat each food was capable of producing when burned outside the body, after which it was more or less simple to calculate the heat production of each of the food combinations within the organism. An apparatus known as the "Bomb Calorimeter" [1] was devised by Berthelot, and adapted for the examination of food materials by Atwater and Blakesley. The food material to be tested was placed within the bomb, which was charged with a known amount of pure oxygen. The bomb was then sealed and immersed in a weighed amount of pure water, into which a very delicate thermometer was inserted. The food within the bomb was ignited by means of an electric fuse, and the heat given off by the burning

[1] For full description and methods used, see "Journal of The American Chemical Society," July, 1903.

of the material was communicated to the surrounding water and was registered upon the thermometer. It was evident that some definite name had to be devised by which these heat units might be known. Hence the name **"calorie,"** which represents *the amount of heat required to raise the temperature of 1 kilogram of pure water 1 degree centigrade, or about 4 pounds of water 1 degree Fahrenheit.*

Transformation of Foods into Available Fuel.—A comparison has been made between the human body and steam engine, but this comparison is not adequate, since the food does not produce heat within the body originally, but energy of which heat is a by-product. Each food combination has a certain amount of dormant energy within its structure and this energy does not become active nor can it be utilized by the body until the food, of which it is a part, is changed within the organism to substances more nearly like its own. This liberated active energy is then used as a motive power to carry on the internal and external work of the body, and the heat, which is invariably the consequence of any active energy (motion), leaves the body as such. It will be seen, then, that the human body acts not as a steam engine, but rather as a **transforming machine** by means of which the dormant energy of the food is transformed into an active agent of which heat is a natural result.

In the calorimeter it was found that the carbohydrates and fats burned to the same end products, namely, carbon dioxide and water, while the proteins, upon oxidation, produced carbon dioxide, water, and nitrogen gas. In the body it was found that the carbohydrates and the fats acted in exactly the same manner as in the calorimeter, producing the same end products. But this was not the case with the proteins; the oxidation process of this chemical combination was found to be not nearly so complete within the body as in the calorimeter, and instead of the free nitrogen as produced in the apparatus there were urea and other nitrog-

enous substances eliminated which, while combustible represented a less complete oxidation of the proteins.

Fuel Factors of Food.—When carbohydrates, fats and proteins are burned (or oxidized) in the body the amount of heat that each is capable of yielding is measured in calories as follows:

1 gram of carbohydrate will yield ....4 calories
1 gram of fat will yield..................................9 calories
1 gram of protein will yield ....4 calories

These figures 4—9—4, are known as the *fuel* factors of carbohydrates, fats and protein respectively.

Determining the Fuel Value of Food.—In determining the amount of heat produced by a given amount of food, it is first essential to reduce the amount given to grams. When very accurate calculations are desired, the actual number of grams contained in 1 ounce should be used on which to base the estimate per pound. For example, by weight an ounce weighs 28.35 grams, a pound weighs 16 ounces, hence 1 pound would weigh exactly 453.6 grams. As a rule, however, the dietary calculations as made by the vast majority of physicians are based on 30 grams per ounce or 480 grams per pound. These scientists contend that the latter figure is sufficiently close to the actual amount to warrant its use, and the round number ending in a cipher simplifies the process of figuring a diet and is therefore more useful than the fractional figure 28.35 grams.

Having reduced the amount given to grams, and knowing the chemical composition of the food, that is the number of hundredths of protein, carbohydrates and fats contained in (see table IV) the food to be calculated, it is a simple matter to multiply the numbers of grams by these figures and thus obtain the actual amount of protein, carbohydrate, and fat in grams, then multiply by the fuel factors 4—9—4, the number of calories produced by 1

gram of protein, fat, and carbohydrate respectively. For example, suppose the fuel value of 1 pint of milk was desired, the calculation for determining the number of calories produced by 1 pint of milk would proceed as follows: *1st step*: 1 pint contains 16 ounces, 1 ounce contains 28.35 grams (metric weight), hence 16 ounces or 1 pint would contain 16 x 28.35 or 453.6 grams. *2nd step*: Milk has a percentage composition of 3.3 per cent protein, 4 per cent fat and 5 per cent carbohydrate. Percentage means parts in a hundred. The gram is the unit of weight used in all dietary calculations, to indicate the number of hundredths of protein fat and carbohydrates in the given number of grams it would be necessary to move the decimal two places to the left and proceed as in multiplication, thus: .033 equals the amount of protein in each gram of milk, .04 the amount of fat in each gram of milk, and .05 the amount of carbohydrates contained in each gram of milk.

453.6 x .033=14.96 or the amount of protein in 1 pint of milk.
453.6 x .04=18.14, the amount of fat in 1 pint of milk.
453.6 x .05=22.68, the amount of carbohydrate in 1 pint of milk.

3rd step: The number of grams of each of the foodstuffs found in the pint of milk must now be multiplied by the individual fuel factor, 1 gram of protein produces 4 calories of heat, hence 14.96 grams of protein will contain 4 times 14.96 grams. 1 gram of fat produces 9 calories of heat, hence 18.64 grams will produce 9 x 18.14 calories. 1 gram of carbohydrate produces 4 calories of heat, hence 22.68 grams will produce 4 x 22.68 calories, or

14.96 x 4= 59.84 calories from protein
22.68 x 4= 90.72 calories from carbohydrates.
18.14 x 9=163.26 calories from fat.

Or a total calorie or fuel value of 313.8 calories from 1 pint of milk.

The simpler and more rapid calculation is made by using the 30 grams per ounce, thus:

16	x	.30=480	grams in 1 pint of milk.
480	x	.033=15.84	grams of protein in 1 pint of milk.
480	x	.04=19.2	grams fat in 1 pint of milk.
480	x	.05=24.0	grams carbohydrate in 1 pint of milk.
15.84	x	4= 63.36	calories from protein.
19.2	x	9=172.8	calories from fat.
24.0	x	4= 96.0	calories from carbohydrates.

or a total fuel value of 332 calories.

In making extensive calculations of the fuel value of foods constituting a dietary it is frequently found possible to drop the fractions and use the figure closest to the whole number, for example in the above estimation of the fuel value of milk, instead of multiplying 15.84, the round number 16 is used instead of multiplying 19.2, the fraction under one half is dropped, the difference in total amounts is so small that it does not seem worth the additional effort and time required to multiply the fractional parts.

In some instances it is desirable to arrange the dietary in 100 calorie portions, but for estimating the average hospital diet it is simpler to use the standard 100 gram portions.

SUMMARY

We may sum up our knowledge regarding the heat production of food as follows:

(1) That the "calorie" is the unit used to measure the heat producing power of food (or its equivalent in body structure).

(2) That this unit represents the amount of heat required to raise 1 kilogram (or 1 liter) of water 1 degree centigrade.

(3) That only the organic foodstuffs (carbohydrates, fats and proteins) and alcohol are capable of yielding heat when oxidized (burned) in the body.

(4) That all of the food eaten is not available for the production of heat because a certain amount is lost in digestion and some is lost by not being thoroughly oxidized (1.3 calories to each gram of protein).

(5) That the actual number of heat units produced by carbohydrates, fats and proteins is 4 calories per gram from carbohydrates, 9 calories per gram from fats, and 4 calories per gram from protein. Alcohol will yield 7 calories per gram.

(6) That we call these figures, 4—9—4—7—the fuel factors for carbohydrates, fats, protein and alcohol respectively.

(7) That to estimate the heat producing power of a diet it is necessary to know the percentage composition of the food, together with the amount of the food (in grams) to be estimated, to determine the amount of each foodstuff in grams occurring in the foods in question, and to multiply the results by the fuel factors for each foodstuff. When these figures are added together the result obtained will be the fuel or energy value of the diet.

(8) That it will not be possible to arrive at a correct answer unless the student has a thorough knowledge of the metric system, can figure the percentage composition of the foods used from the tables given for that purpose, and can make use of the fuel factors of each foodstuff.

It is not difficult to accomplish this, but it calls for accuracy on the part of the nurse and an elementary knowledge of arithmetic, both of which are essential to any student aspiring to become a well trained nurse.

CHAPTER III

THE FOOD REQUIREMENTS OF THE BODY

THE human body, as far as can be judged, does not use one nutrient to the exclusion of another, but science has proved that the best results are obtained from diets balanced to suit the needs of the body, providing the fuel and repair materials in the amounts which are calculated to give the maximum value with the minimum expenditure on the part of the organism.

For while no two individuals are exactly alike, there are factors which govern or influence the food requirements of all, and thus make it possible to estimate the needs of the body with a fair degree of accuracy.

It has been found, by means of calorimeter experiments (direct and indirect), that a certain amount of heat is produced within the body, regardless of external movement or food; that is, when a body is lying absolutely quiet with no movement save that of breathing, the internal work of the organism, which is continuous, releases so much heat, and this is produced whether there is food to replace it or whether the body structure is burned. This is known as the **basal rate of metabolism**, and constitutes the normal **basal requirements**. Any external movement will increase this rate; the greater the activity the higher the increase. Consequently external work calls for food in addition to that which is used to run the engine, in order to save the body from destruction.

DuBois[1] finds "Basal Metabolism above normal in exophthalmic goiter, in fevers, in lymphatic leukemia, and in pernicious anemia, in severe cardiac disease, and in

[1] "Archives of Internal Medicine," Vol. XXVII (1916), p. 916.

some cases of severe diabetes and cancer; it is lower than normal in cretinism, and in myxedema, in old age, in some wasting diseases and perhaps in some cases of obesity." This fluctuation in the Basal Rate of metabolism furnishes a factor in the diagnosis of disease, not only recognized but coming more and more in use.

FACTORS DETERMINING THE FOOD REQUIREMENTS OF THE BODY

For the Adult.—Muscular activity, Age, Size, and Body temperature constitute the most important factors influencing the food requirements. The physical condition and environment of the individual also exert a certain amount of influence upon the intake of food.

Work.—Muscular activity, as already stated, increases the body expenditures; consequently the more active the work the greater amount of energy food needed per unit of weight.

Age.—As the individual grows older, the rate of metabolism decreases until, in old age, it is not more than a third to a fifth of what it was in earlier life. This is due to a general "slowing down" of the machinery, the heart does not beat so rapidly, nor is the respiration so quick. The digestive organs, the heart, the liver, and the kidneys, cannot handle the volume of food which was required during the period of greatest physical activity. Hence, any great excess over and above that which is needed for the maintenance of the body in health will be a source of danger to the elderly person. Von Noorden claims the food requirements of individuals from

> 60 to 70 years of age to be reduced 10%; for people from
> 70 to 80 years of age to be reduced 20%; for people from
> 80 to 90 years of age to be reduced 30%.

Sex.—Science has proved, that there is little difference in the food requirements of men and women, provided they

are alike in age, weight and size, and are doing the same amount and type of work. But women, as a rule, weigh less than men, hence their food requirements are approximately less.

Murlin finds the food requirements of pregnant women to be somewhat higher than of non-pregnant ones, and the requirements of the nursing mother to be higher than either (see chapter on Pregnancy and Lactation).

Size (Surface Area).—One of the most important indices to body requirements is the surface area of the body, the heat lost is directly proportional to its surface area, rather than to its weight—the greater the surface area the higher the energy requirements.

Body Temperature.—With a rise in the body temperature (above the normal) there will be a corresponding need for an increase in energy material. According to DuBois, fevers increase the energy expenditures approximately 7 per cent for each degree Fahrenheit above the normal level.

For the Child.—The factors influencing the food requirements are different, to a certain extent, from those of the adult. The main difference lies in the fact that the adult needs food only for the maintenance and repair of the body, while the child must have food, not only to cover its maintenance requirements, but to support the growth and development which should be continuous from birth to maturity. Resistance, too, must be developed during this period in order to safeguard the child through life.

The rate of metabolism in the infant is greater than at any other period of life, consequently, even if a child were one-third the weight of its parent, it would inevitably cease to grow and would become malnourished, if its food requirements were reckoned at only one-third that of the parent.

Adjusting the Food Requirements.—Taking these fac-

tors as guides for estimating the food requirements of man, it is evident that no hard and fast law can be laid down to cover all, that each individual must adjust the food intake according to the weight and activity of the body.

Energy Expenditures per Hour.—The following outline shows the energy expended under different conditions of muscular activity.

Energy Expenditures per Hour Under Different Conditions of Muscular Activity [2]

Form of Activity	Calories per Hour		
	Per 70 Kilograms (Average Man)	*Per Kilo-gram*	*Per Pound*
Sleeping	65	0.93	0.43
Awake lying still	77	1.10	0.50
Sitting at rest	100	1.43	0.65
Reading aloud	105	1.50	0.69
Standing relaxed	105	1.50	0.69
Hand sewing	111	1.59	0.72
Standing at attention	115	1.63	0.74
Knitting (23 stitches per minute on sweater)	116	1.66	0.75
Dressing and undressing	118	1.79	0.81
Singing	122	1.74	0.79
Tailoring	135	1.93	0.88
Typewriting rapidly	140	2.00	0.91
Ironing (with five-pound iron)	144	2.06	0.93
Dishwashing (plates, bowls, cups and saucers)	144	2.06	0.93
Sweeping bare floor (38 strokes per minute)	169	2.41	1.09
Bookbinding	170	2.43	1.10
"Light exercise"	170	2.43	1.10
Shoe making	180	2.57	1.17
Walking slowly (2.6 miles per hour)	200	2.86	1.30
Carpentry, metal working, industrial painting	240	3.43	1.56
"Active exercise"	290	4.14	1.88
Walking moderately fast (3.75 miles per hour)	300	4.28	1.95
Stoneworking	400	5.71	2.60
"Severe exercise"	450	6.43	2.92
Sawing wood	480	6.86	3.12
Swimming	500	7.14	3.25
Running (5.3 miles per hour)	570	8.14	3.70
"Very severe exercise"	600	8.57	3.90
Walking very fast (5.3 miles per hour)	650	9.28	4.22

[2] Chemistry of Food and Nutrition, 3rd Edition, Page 220. Courtesy of Dr. Sherman.

To facilitate the estimation of the food requirements for average individuals, the following table is included:

Sleeping	0.42 calorie per hour, per lb. of body wt.
Awake, lying still	0.50 calorie per hour, per lb. of body wt.
Sitting at rest	0.65 calorie per hour, per lb. of body wt.
Light muscular exercise	1.10 calories per hour, per lb. of body wt.
Active muscular exercise	1.90 calories per hour, per lb. of body wt.
Severe muscular exercise	3.00 calories per hour, per lb. of body wt.

Possibly a few explanatory words, as to the terms used in the above tables, will assist the nurse in making the necessary calculation. "Sleeping quietly" makes allowance for no movement save that of respiration; any undue restlessness will call for an increase in the above allowance.

"Sitting at rest" includes the time spent at meals, sitting in class room, ward office, studying or reading. It does not include much walking about the room, rising frequently, or nervous restlessness.

"Light exercise" includes all light house work, running an ordinary sewing machine, walking about office or ward, (receiving ward included). It does not include washing, sweeping or scrubbing.

"Active exercise" includes washing, sweeping, scrubbing, general house work, carpentry, and such sports as tennis, basket ball, and ordinary gymnasium work.

"Severe exercise" includes road workers (working with pick and shovel) fast running, baseball, football, and swimming.

"Very severe exercise" includes the work done by miners, handling of freight, and lumbermen, especially those working in extreme cold, where the severe cold makes extra demands on the fuel supply. By making use of the averages just mentioned it should be a simple matter to calculate the food requirements of any normal individual. It is necessary to know the weight of the person in question, and the manner in which the twenty-four hours are spent,

and, in the case of elderly individuals, make the reductions believed to be necessary for health.

Method of Using the Tables.—Let us take a nurse in training for this purpose. Suppose the nurse weighs 110 pounds, and spends the twenty-four hours as follows,

Sleeping	8 hours
Sitting at meals	2 hours
Studying	2 hours
In class	1 hour
On duty	9 hours
Off duty (walking briskly)	2 hours

Her daily food requirements would probably be approximately 2,235 calories. This estimate would be increased, if she were obliged to do much heavy lifting, scrubbing of beds, or other duties requiring the expenditure of much effort. It would be decreased if the hours spent in study and class room work were increased and the hours on the ward shortened. The estimation may be made as follows,

Sleeping 8 hrs.	$110 \times 0.42 \times 8 =$ 370	calories
Sitting at meals 2 hrs.	$110 \times 0.65 \times 2 =$ 143	calories
Sitting in class 1 hr.	$110 \times 0.65 \times 1 =$ 71.5	calories
Studying, 2 hrs.	$110 \times 0.65 \times 2 =$ 143	calories
On duty 9 hrs.	$110 \times 1.10 \times 9 =$ 1089	calories
Off duty (walking briskly) 2 hrs.	$110 \times 1.90 \times 2 =$ 418	calories
Total for day	2234.5	calories

This estimate may be made to suit any individual, the man in the office or the one working on the streets, the woman living at home or the one spending eight or ten hours scrubbing the floors of a great office building; it is simply a matter of adjusting the calories in the dietary to meet the requirements of body weight and muscular activity.

The following tables demonstrate another method for determining the Energy requirements of an individual. These are based upon the expenditures of the body per square meter of body surface area per hour.

TABLE SHOWING **Surface Area in Square Meters** FOR DIFFERENT HEIGHTS AND WEIGHTS ACCORDING TO THE HEIGHT-WEIGHT FORMULA OF DUBOIS AND DUBOIS.[3]

HEIGHT IN CENTIMETERS	WEIGHT IN KILOGRAMS																
	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
200							1.84	1.91	1.97	2.03	2.09	2.15	2.21	2.26	2.31	2.36	2.41
195						1.73	1.80	1.87	1.93	1.99	2.05	2.11	2.17	2.22	2.27	2.32	2.37
190				1.56	1.63	1.70	1.77	1.84	1.90	1.96	2.02	2.08	2.13	2.18	2.23	2.28	2.33
185				1.53	1.60	1.67	1.74	1.80	1.86	1.92	1.98	2.04	2.09	2.14	2.19	2.24	2.29
180				1.49	1.57	1.64	1.71	1.77	1.83	1.89	1.95	2.00	2.05	2.10	2.15	2.20	2.25
175	1.19	1.28	1.36	1.46	1.53	1.60	1.67	1.73	1.79	1.85	1.91	1.96	2.01	2.0	2.11	2.16	2.21
170	1.17	1.26	1.34	1.43	1.50	1.57	1.63	1.69	1.75	1.81	1.86	1.91	1.96	2.01	2.06	2.11	
165	1.14	1.23	1.31	1.40	1.47	1.54	1.60	1.66	1.72	1.78	1.83	1.88	1.93	1.98	2.03	2.07	
160	1.12	1.21	1.29	1.37	1.44	1.50	1.56	1.62	1 68	1 73	1.78	1.83	1.88	1.93	1.98		
155	1.09	1.18	1.26	1.33	1.40	1.46	1.52	1.58	1.64	1.69	1 74	1.79	1.84	1.89			
150	1.06	1.15	1.23	1.30	1.36	1.42	1.48	1.54	1.60	1.65	1.70	1.75	1.80				
145	1.03	1.12	1.20	1.27	1.33	1.39	1.45	1.51	1.56	1.61	1.66	1.71					
140	1.00	1.09	1.17	1.24	1.30	1.36	1.42	1.47	1.52	1.57							
135	0.97	1.06	1.14	1.20	1.26	1.32	1.38	1.43	1.48								
130	0.95	1.04	1.11	1.17	1.23	1.29	1.35	1.40									
125	0.93	1.01	1.08	1.14	1.20	1.26	1.31	1.36									
120	0.91	0.98	1.04	1.10	1.16	1.22	1.27										

CALORIES PER SQUARE METER OF BODY SURFACE PER HOUR[4]
(HEIGHT-WEIGHT FORMULA)

Age, Years	*Males*	*Females*
14–16	46 .0	43 .0
16–18	43 .0	40 .0
18–20	41 .0	38 .0
20–30	39 .5	37 .0
30–40	39 .5	36 .5
40–50	38 .5	36 .0
50–60	37 .5	35 .0
60–70	36 .5	34 .0
70–80	35 .5	33 .0

Energy Requirements for Children.—In estimating the energy needs of children, the above method is not satisfactory, since the storage of material for growth must be considered, as well as the activities of the body. The growth period includes the years from birth to the eighteenth year, after which time the food requirements of the body are made on a basis of weight and muscular activity, as in all adults. The table on the following page shows the food

[3] Courtesy Dr. Eugene DuBois, taken from Reprint, Arch. Internal Med., May, 1917, Vol. XIX.

[4] Courtesy Dr. Henry Sherman, from "Chemistry of Food and Nutrition," Third Edition, by Sherman.

allowances made for healthy children; in the feeding of malnourished or underweight children, more food in proportion to age is given in order to overcome the handicap under which they are suffering.

Children, like adults, differ in degrees of activity; that is, one child may be very active, running and playing more strenuously than another. Hence a margin of safety must be allowed to cover the energy expenditures of the more active child, to safeguard it against becoming malnourished.

To facilitate the computation of the food requirements of children a schedule showing the number of calories per pound of body per day is included on opposite page.

The food requirements are such as to allow of a steady increase in the weight and stature of the child; the rate of gain for normal children should be as follows:

FOOD ALLOWANCES FOR HEALTHY CHILDREN [5]

AGE	CALORIES PER DAY	
Years	*Boys*	*Girls*
Under 2	900–1200	900–1200
2– 3	1000–1300	980–1280
3– 4	1100–1400	1060–1360
4– 5	1200–1500	1140–1440
5– 6	1300–1600	1220–1520
6– 7	1400–1700	1300–1600
7– 8	1500–1800	1380–1680
8– 9	1600–1900	1460–1760
9–10	1700–2000	1550–1850
10–11	1900–2200	1650–1950
11–12	2100–2400	1750–2050
12–13	2300–2700	1850–2150
13–14	2500–2900	1950–2250
14–15	2600–3100	2050–2350
15–16	2700–3300	2150–2450
16–17	2700–3400	2250–2500

[5] Gillet, A. I. C. P. of N. Y.

CALORIES PER POUND OF BODY WEIGHT PER DAY[6]

Years	*Calories per Pound, per Day*
Under 1 year	45
1- 2	40-43
3- 4	37-40
4- 5	37-40
5- 6	35-37
6- 7	34-35
7- 8	32-34
8- 9	30-35
9-10	30-35
10-11	28-32
11-12	28-32
12-13	28-32
13-14	25-30
14-15	20-25
15-16	20-25
16-17	20-25

After which time the food requirements are based on degree of muscular activity, boys and girls of seventeen years and over requiring as much food as men and women.

AVERAGE RATE OF GAIN PER WEEK, FOR NORMAL CHILDREN

Age, Boys	*Average Gain, Ounces*	*Age, Girls*	*Average Gain, Ounces*
First year	3½-4½	First year	3½-4½
Second year	2½-3	Second year . . .	2½-3
Third year	1¾-2	Third year	1¾-2
Fourth to eighth year (inclusive) . . .	1¼-1½	Fourth to eighth year (inclusive) . . .	1¼-1½
Ninth to eleventh year (inclusive) . . .	1¾-2	Ninth to twelfth year (inclusive) . . .	1¾-2¼
Twelfth to thirteenth year (inclusive) . .	2¾-3	Thirteenth to fifteenth year (inclusive) . .	2¾-3¼
Fourteenth to sixteenth year (inclusive) . .	3 -4	Sixteenth and seventeenth year (inclusive)	1 -2

The averages just given are for healthy children; those who are underweight for their age and height should show a more rapid increase in weight with an increased food

[6] Table compiled from material in "Feeding the Family," by Rose.

allowance. It must also be remembered that a simple gain in weight is not sufficient evidence of a child's normality; a freedom from gastro-intestinal disturbances, and a resistance to disease, are equally essential.

There have been tables arranged to show the proper weight for height for boys and girls of different ages (see appendix). These are valuable since, by their use, attention is called to the child who is not up to the average. Medical examination of such children frequently shows reason for their underweight, and measures may be instituted which may save the child from a lifetime of poor health.

Dr. Pirquet has arranged a scale (Pelidisi Chart) showing the state of nutrition in children, based upon the sitting height (in centimeters), to weight (in kilograms).

PROTEIN REQUIREMENTS

For Adults—1 gram of protein per kilogram (0.45 gm. per pound) of body weight per day, is the amount usually used to represent "the standard protein allowance for healthy adults per day. This is approximately fifty per cent above the actual amount required for maintenance. In the average dietary it is possible to allow from 10 to 15 per cent of the total calories to come from protein. Lactation will call for an increase in the daily protein allowance.

For Children—The protein requirements of children are greater per kilogram of body weight per day than for adults, on account of the need for storage material for growth, the standard allowance of from 10 to 15 per cent of the total calories in the form of protein will, however, cover the needs for maintenance and growth, provided the protein is of the proper type (1 quart of milk per day, the

remainder being obtained from other protein-bearing foods).

MINERAL REQUIREMENTS

Just as energy foods and proteins must be adjusted in the dietary to safeguard the health of the body, so the mineral salts must be adjusted for a like purpose. Studies made of the dietaries of a number of families brought to light the fact that the children more often suffered from a deficiency of calcium, phosphorus and iron in their diets than they did from too little protein,[7] proving that it is quite as essential to adjust the mineral salts in the diet as it is that of the organic constituents.

According to Sherman the diet of an adult should contain each day per pound of body weight:

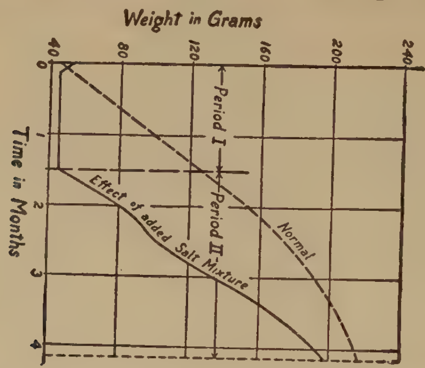
Protein	0.5	gram or more
Phosphorus	0.01	gram or more
Calcium	0.005	gram or more
Iron	0.0001	gram or more

These averages, while covering the needs of the mature body, do not furnish the necessary amount of protein, or mineral salts to support the growth and development of the child. Hence, it has been deemed advisable to reckon the requirements of the latter per thousand calories, instead of per pound of body weight, in this way obviating some of the danger of protein and mineral deficiencies.

McCollum, Simmonds and Pitz have shown that a deficiency in the inorganic content of a diet may result in a retarding or suspension of growth. This result has been overcome on the introduction of the proper mineral salts into the diet. This salt mixture is such as to make the total ash, approximate that found in the composition of milk ash.

[7] "The Adequacy and Economy of Some City Dietaries," by Sherman and Gillett.

The following diagram illustrates this point.



Effect upon growth of adding to a diet otherwise adequate a salt mixture of such composition as to make the composition of the total ash similar to that of milk ash; immediate resumption after entire suspension of growth. Courtesy of Dr. E. V. McCollum.

The following outline will serve as a guide in making the estimates for the food requirements of children:

THE DIET OF A CHILD SHOULD CONTAIN FOR EVERY 1000 CALORIES FURNISHED BY THE FOODSTUFFS

Protein	25.00	grams or more
Phosphorus	0.48	gram or more
Calcium	0.25	gram or more
Iron	0.005	gram or more

Vitamin Needs.—We have seen the manner in which the energy and protein foods have been adjusted in the diet, but these can not alone assure the body, and especially the growing body of a normal maintenance and repair of its tissue, or support the growth which is essential at this time. This function is believed to belong to the vitamins, since feeding experiments have demonstrated the fact that animals soon cease to grow, develop deficiency diseases, and finally die, when deprived of the essential constituents. Gillett advises, as a safe rule, the use of one, and preferably two foods known to be rich in the fat soluble vitamin, in each day's food allowance, milk and leafy vegetables, for

example. If the foods containing phosphorus, calcium, and iron are taken in sufficient quantity, the second, or "B" vitamin needs, will probably be adequately covered, but the presence of the "C" vitamin must be carefully attended to; some fresh fruit or vegetables (see Table V) is obligatory each day to insure the individual against the development of scurvy.

Factors Affecting the Food Selection.—The estimation of the energy needs of the body, and the selection of the foods to furnish the fuel for this purpose, depend largely upon the individual. The digestion of the fats, as well as the way in which the body utilizes them, makes the use of this foodstuff more or less limited according to the ability of the individual to take care of them, the minimum allowance for children being between 2 and 3 ounces per day. According to Gillett, "If boys and girls get at least this amount from butter and its substitutes, cream, bacon, fat meat and oils, additional amounts from their food will provide a margin of safety, without overtaxing the digestive system."

After determining the amount of fat required in each day's food allowance, it is a simple matter to adjust the carbohydrates. It is safer from a health standpoint, to obtain the greater portion of this foodstuff from starchy foods rather than from the sugars, many foods rich in starch, likewise contain appreciable amounts of protein and fat, whereas sugar is practically one hundred per cent carbohydrate. The ease, too, with which this substance ferments in the stomach, and the manner in which it destroys the appetite for other foods, makes the use of much of it in concentrated form unadvisable, especially in the diet of children.

The amount of sugar allowed each day, should be limited to an ounce or ounce and a half (2 to 3 tablespoonfuls), and a less quantity is desirable. In order to obtain the

best results, with the least deleterious effect on the body, it is advisable to give sugar in dilute form. A piece of pure candy after a meal may not harm the child; but just before, or between meals, as well as the habit of making the breakfast cocoa and cereal of syrup-like sweetness is deplorable, and should in all instances be discouraged.

The Amercian Red Cross recommends the following method for estimating the amount of sugar in the dietary: "Add one-half the weight of such foods as jellies, jams and preserves, and three-quarters the weight of such foods as candy, honey and syrup, to the weight of sugar used." The amount of sugar consumed, as such, by the adult each day, is not of such paramount importance as it is in the case of children, but even for adults an excessive amount of carbohydrate in this form is not considered advisable from a health standpoint.

In order to assure each member of the family of getting all of the materials needed for the growth, repair and regulation of their bodies, as well as the necessary fuel material with which to run the engine and to maintain the proper body temperature, the following practical method is suggested for the planning of the daily dietary.

The Diet Each Day Should Contain:

1. Milk:

   One quart for each child under two years of age. From 1 pint to 1 quart for each child from two to five years of age. (M. S. Rose of Teachers' College advises at least a quart for every child of six years and under, at least 1 pint for children from six to sixteen, and one half of a pint thereafter.

2. Cereals and Breadstuffs:

   (Activity of person determining the amount.)

For children under two years of age	1- 3 oz. a day
For children from two to five years	2- 5 oz. a day
For children from five to twelve years	5- 9 oz. a day
For all over twelve years of age	9-16 oz. a day

3. Meat or its Substitute:

For children under five years no meat is needed.

(*a*) Meat:

For children from five to ten years . . .	1-2 oz. (no more) a day
For children from ten to fourteen years .	2-4 oz. (no more) a day of meat or fish.
For individuals over fourteen years . . .	2-6 oz. should be the maximum for the day.

(*b*) Eggs:

For children under two years	no eggs are given.[8]
For children from two to five years . . .	3-5 eggs may be given each week, being substituted for part or all of the meat.

(*c*) Beans, Peas, Cheese:

For children it is necessary to use milk abundantly when beans or peas are substituted for the meat or egg proteins.

4. Vegetables:

For children under six months[9]	no vegetables need be given.
For children from six to nine months . .	1 oz. gradually increased to 6 oz. of strained vegetable soup (see formula, page 223).
For children from twelve to fifteen months .	1 small baked potato may be added, and such vegetables as peas, string beans, carrots, spinach, squash, lima beans (strained).

Two vegetables, one of which should be potatoes (white), should be given each day. A leafy vegetable ((spinach greens, string beans, kale, lettuce) should be given from three to four times each week and oftener if possible.

5. Fruit:

For children from six months on (earlier if physician approves)	1-2 tablespoons orange or prune juice a day.
For children from first to second year . .	1-3 tablespoons twice daily.

[8] Part of soft cooked egg may be given at the beginning of eleventh month; this must be given at the noon meal, and should not be included in each day's meal (two or three times a week is sufficient).

[9] Dr. Hess advises the use of canned tomato juice as a substitute for orange juice when the latter is unobtainable.

For children from two to five years . . . . 3-4 tbsp. or more, twice daily (amount governed by health of child).

All children should be given fresh fruit three or four times a week; some fruit given every day. Adults may be served dried fruit most days, but some fresh fruit should be given each week.

6. Desserts:

One sweet dish (custards, cereal puddings, junkets) once or twice a day, but little if any clear sugar should be given (cereals should be served with very little if any sugar).

7. Fats:

For each person over five . . . . 2-3 oz. of fat (purchased as such) a day, depending upon the age and ability of the individual to digest fats.

SUMMARY

In summarizing the needs of the body in terms of foodstuffs and vitamins it is seen that the body requirements are based upon the body expenditures: (1) internal or con-constant expenditures, the amount of energy, in terms of calories, required to carry on the work of circulation, respiration, cellular activity, and tone of muscles and nerves; (2) the work of the digestive apparatus, and the entrance of food into the blood stream which increases the expenditures by stimulating the rate of metabolism; (3) maintenance, development and growth of tissues; (4) external work or muscular activity; (5) body temperature, according to DuBois the energy requirements of the body show a variation of seven per cent. for each increase or decrease of one degree Fahrenheit above or below the normal level; (6) surface area, the loss of heat from the body to be proportional to its surface area; (7) the body processes must be regulated by an intake of mineral salts proper in type and amount; (8) the general health and welfare of the body, its resistance to infections, for prevention of deficiency dis-

eases, for health of the gastro-intestinal tract, for stimulation of appetite and for the promotion of growth in the young there is a constant and daily need for the food essentials—Vitamins A-B-C-D-E and possibly others.

SECTION II

LABORATORY OR DIET KITCHEN WORK

CHAPTER IV

METHODS OF FEEDING IN NORMAL AND ABNORMAL CONDITIONS

There are several methods of feeding which have been adopted to meet the needs of the individual under various conditions: Feeding by mouth, gavage or forced feeding, rectal feeding (nutrient enemata), and inunction.

Feeding by Mouth.—The first method is the one used in health and in the majority of abnormal conditions. In cases where there is a certain abnormal development of the mouth or throat, and in some cases of insanity or unconsciousness, where for some reason it is impossible for the individual to swallow, this method cannot be used.

Forced Feeding.—With very young children and babies gavage or forced feeding is found at times to be necessary. In these cases a small rubber catheter is introduced into the stomach through the nostrils and the milk or other fluid poured through the tube. In unconscious or insane patients it is often found necessary to insert a gag (a cork will serve the purpose) between the teeth to prevent the biting of the tube when it is inserted through the mouth into the stomach.

Food Used for Forced Feeding.—The food in these cases consists of reënforced soups, milk gruels, or nutrient beverages, not more than six or eight ounces given at one time. Finely chopped meat and vegetables purées have been given in this way when the digestion of the patient was not

impaired, but when conditions rendered it necessary to resort to this method of feeding.

Technique of Gavage.—The apparatus used in gavage consists of a moderate sized soft rubber tube to which is attached a rubber or glass funnel and a "pinch cock." The tube should be filled with water to prevent air entering the stomach and causing pain or discomfort. In certain cases the patient refuses to swallow the tube and it will be found necessary to use some means to force the passage if the throat is shut off. By closing the nostrils the patient will be obliged to breathe through the mouth, thus opening the passage into the throat through which the tube may be quickly slipped. In certain abnormal conditions the gastric organ is so badly impaired as to render it impossible for the patient to retain food taken in by way of the mouth. It is often found that food introduced into the stomach by means of the "stomach tube" will be retained and utilized which otherwise would be rejected. It is disagreeable, however, and should only be used when it is impossible to feed otherwise.

Rectal Feeding is used when the other organs of digestion are impaired to such an extent as to render the need of more food obligatory. Many investigators believe that rectal feeding is absolutely useless, while others have firm faith in its efficacy.

Materials Used in Rectal Feeding.—As a rule the body's ability to utilize foods passed directly into the colon is distinctly limited, even when such foods have been predigested. Glucose, however, has proved an exception, possibly because it is the form in which the body uses the carbohydrates and consequently is all ready for absorption when introduced.

Glucose Enemas.—A ten per cent. glucose solution is found to be more readily retained than those of higher per-

centages. The solution is made from a physiologic sodium chloride solution, this being found more efficacious than those made of plain water. The enema is given hot, by the drip method. The number of feedings per day is regulated by the physician.

SPECIAL DIETS

There are a number of diets formulated to meet the various normal and abnormal conditions. In hospitals these are classified as follows, for the convenience of both nurse and doctor:

Restricted Liquid Diet.—Consisting of strained fruit juices, fat free broths, water, tea, coffee (without cream or milk).

Liquid Diet.—All liquids contained in restricted liquid diets plus milk, ice cream, reinforced beverages, strained cereal gruels, milk or cream soups, gelatin jellies, junket, malted milk, cocoa, cream.

Soft Diet.—All foods included under liquid diets plus eggs cooked in every way except hard or fried, unstrained cereals, bread (usually toasted), crackers, puréed vegetables baked potato, cooked fruit free from skins, seeds and coarse fiber, cottage cheese, sponge cake, cereal milk, puddings.

Light Diet.—All foods included under Soft Diet, plus tender young vegetables, chicken, fish, sweetbreads, brains, lamb chops, crisp bacon, oranges, grapefruit, soft peaches, grapes (without seed or skin), macaroni (without Italian dressing, but with milk and grated cheese in moderate quantities), breads, simple desserts.

Full Diets.—All foods included in other diets plus salads, roast meats (except pork). All vegetables (except old cabbage or old turnips). Mayonnaise or French dressing. 1000 Island dressing. All soups.

There are many so called Special Diets or diets formulated to meet the needs of some definite pathological condition. Some of these diets have become so well known and so universally used that they might almost be called "standard," where, as others possibly equally as valuable, are confined to a definte locality because the physicians who devised them have not published them where others see and make use of them.

In a text of this character, it is clearly impossible to include all, even of the known "therapeutic diets," but a brief classification is included here.

THERAPEUTIC DIETS

Anemia Diets (Pernicious or Primary)	High Iron, and protein of a purin bearing type, such as is to be found in glandular organs.
Cardiac Diets	Karell, Modified Karell; Low protein and low salt diets; Restricted fluids.
Diabetic Diets (with or without Insulin)	Carbohydrate—Low (general), Carbohydrate—High (Sansum), Basal, and maintenance diets, Hyperglycemia, Hypoglycemia.
Gastric Disorders	Acute gastritis (liquid and soft), Hyperchlorhydria, Hypochlorhydria, Cancer diets, Ulceration, stomach and duodenum, duodenal feeding diets, pre- and post-operative diets for gastric resection, cancer, etc.
Intestinal Disturbances	Constipation diets: Atonic; Spastic; Obstructive Colitis, Enterocolitis, Appendicitis Diarrhea: Fermentative; Putrifactive Smooth diets for diarrhea Bland diets for diarrhea
Wasting Diseases: Typhoid Fever, Tuberculosis, Malnutrition	High Calorie Diet (General) High Calorie Diet (Liquid) High Calorie Diet in which calories are derived more from easily digested fats than from carbohydrates (T. B.)

Diseases of Kidneys and Hypertension	Nephritic Diets, Protein and Salt Low Diets (Restricted Fluids in some cases), Purin Free Diets, Basic diets (Sansum and Blatherwick), Nephrosis (Epstine's High Protein Diet, Hypertension Diet, protein and salt low diets, also Sansum's Basic or Alkaline Diet.
Liver and Bile Passages	Fat low diets with carbohydrates in form of starch rather than sugar, high bulk diets (fruits and vegetables), diets low in Cholesterol and Phytosterol.
Reduction or Obesity Diets....	Low Calorie Diets, High Protein with low fat and carbohydrate content, Obesity Diets for special disturbances (heart, diabetes, etc.)
Other Disturbances calling for Dietary Adjustments: Epilepsy, Hyperthyroidism Hypothyroidism, Pellagra, Feces-Free and Retension diets for pre- and post-operative conditions.	Ketogenic Diets for Epilepsy, Adjusted High Calorie Diets, Goldberger's Pellagra-preventing Diets (P. P.), Non-Ketogenic-Acidosis Diets, Scarlet Fever Diet (nephritic), Post-Operative Diets.
Test Diets	Concentration test diet for testing concentration power of kidneys, Mosenthal's diet for testing kidney function. Test Diet for measuring motility of the gastric organ, Schmidt's Intestinal Test Diet.

Factors Effecting the Administration of Food for the Sick.—The feeding of the sick always calls for special care and attention on the part of the nurse. She has to consider not only the physical but also the mental problems which enter into the treatment of each and every patient. She must understand, more or less, the religious and racial scruples of those coming under her charge, their likes and dislikes, and also any food allergy which may be present in any patient and which must be considered if the best results are to be obtained from dietary management.

The administration of diets for special conditions must

necessarily call for a greater attention to detail than those diets which have become more or less standardized (regular hospital diets). Every patient requires individual adjustment to meet the individual requirements of his especial case. Each diet prescription must be filled individually, and while it is perfectly possible to administer many of the same foods to a group of patients suffering from the same disorder (as in diabetes), each patient's tray will have to be arranged separately since each prescription differs more or less from the others. The amount of each article of food may have to be weighed, estimated and charted for each and every patient on therapeutic diets. Such details must be accomplished through study in the dietetic laboratory. A nurse should be able to fill a diet prescription with the same accuracy and facility that a pharmacist displays in filling a prescription for drugs.

The charting of special diets likewise requires care and attention from the nurse. She must keep in mind that it is the food *eaten* that counts, not the food offered, so it is necessary to weigh and estimate the food refused in order to keep an accurate record of the food intake on the chart. In doing this the nurse not only gives the physician an accurate knowledge of the patient's food intake, but obtains an understanding of his likes and dislikes which makes the filling of his diet prescription much more satisfactory.

Arranging the Tray.—If the nurse will place the necessary articles upon the tray and memorize their position so that she will be able to duplicate the same at each meal, she will be able to tell at a glance if everything needed is in its proper place, thereby saving herself unnecessary steps and the patient the worry of having to wait until they can be brought. Food should not be allowed to stand in the sickroom, and glasses or plates in which food has been served

should be removed from sight as soon as the patient finishes with them. Care must be taken, however, not to create the impression of hurry or the patient will be made nervous and either will lose her appetite or have indigestion.

The nurse should be careful of her topics of conversation during the meal hour. Especially must disagreeable subjects and business matters be rigidly excluded if the invalid is to obtain the full benefit of the food served her.

1. **Setting the Tray.**—Tray should be sufficiently large not to give the appearance of being crowded, but not too large.
2. Tray cover must be spotless, and of a size to just cover the edges of tray; if too large, make a pleat down the center.
3. Place service plate directly in front of patient.
4. Knife, cutting edge in, to the right of plate; fork, tines up, to the left of plate.
5. Spoons, bowls up, next to the knife.
6. Napkin on the lower left side of tray, open edges to the lower right side.
7. Bread and butter plate on top of napkin.
8. Soup tureen in lower right corner, with cup and saucer above it.
9. Tea or coffee pot and hot-water pot in upper right-hand corner of tray, with sugar bowl next to hot pot and cream pitcher next to sugar bowl.
10. Place salt and pepper next to cream pitcher (to the left).
11. Water glass in upper right corner of tray.
12. Second vegetable dish placed on the upper right side of dinner plate.
13. Place dessert to the upper left of dinner plate.

Suggestions for Serving.—Make tray as attractive as possible.

In the cases requiring special diets, the nurse should make out the "diet sheet" for the day. In hospitals this is passed to the dietitian, who carries out the directions laid down by the physician. The nurse, however, should carefully check the tray before serving it, since mistakes sometimes occur, and to give the wrong food to a patient suffering from certain disorders may give rise to serious trouble, causing pain and discomfort and at times death.

Contamination of Food.—Food should always be protected from dirt and dust and from contamination and pollution from flies and other insects. Typhoid fever and certain intestinal disturbances have been known to result from flies coming in contact with raw food—milk, for example. Poisoning due to polluted water used to freshen vegetables has already been spoken of. All of these types of poisoning may be avoided by using care in the handling of the fresh foods. *Ptomaines*, however, are not easy to prevent. Their source cannot always be traced to one particular article of diet. They may be present in cooked, raw, frozen, or canned foods. At times the evidence of extreme decomposition will be found in the foods themselves, while at other times there will be no such evidence in the food, but the result of the ptomaine will be perfectly evident whenever certain individuals partake of that food. This is a personal idiosyncrasy which it is impossible to account for.

Food Poisoning.—Poison caused by decomposed eggs has manifested itself in individuals who have partaken of cake in which such eggs were used. Canned meat and fish have produced the most violent types of ptomaine poisoning. As a rule in these cases the canned article has begun to decom-

pose and while the decomposition may not have advanced sufficiently far to be discernible from the flavor or odor, it is there, and if the resistance of the individual eating this food is not great, serious danger may result. Poisoning develops in some individuals upon the eating of shellfish, strawberries, oranges, pimentos, and various other foods,—another evidence of personal idiosyncrasy against certain articles of diet. There is no way to overcome these idiosyncrasies; the only thing to do is to warn the individuals so affected to let the offending foods alone.

ADULTERATION OF FOOD

The adulteration of food, which formerly was practised by unscrupulous dealers to cover up inferior articles, or by manufacturers to prevent or arrest decomposition in canned goods, is regulated by law. The passage of the National Pure Food and Drug Act gave the Government authority to regulate the preservatives and coloring matter used in canned and bottled goods, forcing the manufacturers to state on the label the exact contents of each bottle or can. There are likewise stringent laws governing the adulteration of milk, butter, and other articles of food.

Tests for Adulterants.—Boric acid, borax, and formaldehyde are the preservatives more often found in milk. These chemicals are introduced to arrest the natural souring and decomposition which takes place after milk reaches a certain age. Occasionally salicylic acid and sodium carbonate are used. Formaldehyde may be detected by placing about 20 c.c. of milk in a small glass vessel or tube. Dilute with an equal amount of pure water, add commercial sulphuric acid, following it to flow gently down the inside of the tube. A purple ring will appear at the zone of contact if formaldehyde is present. "Boric acid and borax may be

detected by adding a drop or two of hydrochloric acid to a few drops of milk in a white dish and then several drops of a saturated alcoholic solution of *turmeric*. The dish is then heated gently for a few minutes, and, if boric acid or borax is present, a pink or dark red color will appear. A dark blue-green should appear when the dish is cooled and a drop of ammonia added."[1]

Canned goods must be carefully examined before being used. The domestic canned goods are rarely adulterated, but imperfect sterilization and defective cans may bring about a condition of fermentation and gas formation due to bacterial action. Cans should have a concave appearance on the top. If there is a bulging of the can it may be due to gas formation, and a small hole should be made in the can to note any escape of this gas. Should there be any indication of fermentation, the contents should be discarded. It is advisable to look with suspicion on cans that appear old, rusty, and soiled; they are probably left-over stock and liable to be bad. Peas which have been imperfectly sterilized produce a type of gas which is soluble in the liquid. After decomposition has occurred there will be no apparent evidence by the escape of gas, but the liquid will be found to be excessively acid, and will present a muddy appearance. Certain foreign importations of canned goods are preserved in color by the introduction of certain color preservatives. Peas—petits pois, for example—and the very small string beans which are imported are intensely green from the copper sulphate used. Its presence may be detected by adding a few drops of hydrochloric acid to some of the colored material, then dropping in a bright steel nail, knitting needle, or knife blade. There will be a deposit of copper salts (like copper plating) upon the steel if the preservative is present in the can. Canned corn is often

[1] "Diseases of Nutrition and Infant Feeding," by Morse and Talbot.

artificially sweetened with saccharin, which may be detected by shaking several tablespoonfuls of the liquid in an equal amount of chloroform. Saccharin is soluble in chloroform, while sugar is not. Allow the mixture to stand a few minutes and remove some of the chloroform which has settled at the bottom. Place in a small dish, evaporate the chloroform by gently heating the dish; taste the residue; if sweet, saccharin is present.

Coffee is adulterated more often when it is put up in ground or powdered form than when sold in the bean. Real coffee contains a small percentage of oil, and will float when thrown into a glass of water. Substitutes generally sink to the bottom. Coffee substitutes are often made up of starch-containing materials, such as cereals, beans and peas. This starch may be detected by mixing one tablespoonful of the suspected coffee in a little cold water, adding one cup of boiling water; allow it to boil two minutes, filter through cotton, and pass the liquid through charcoal to remove the color. When it is cold, add a few drops of dilute iodine solution. If starch is present, a blue color will appear.

METHODS USED IN THE PREPARATION OF FOOD

Food is prepared for consumption by a number of methods and the method by which the food is prepared either increases or decreases its digestibility, palatability, and general usefulness.

Certain foods, as has already been stated, require a high degree of temperature to make them wholesome, but if this temperature is applied by means of heated fat, as in frying, the food is changed from a wholesome to a more or less indigestible article. In health the organs of digestion are capable of overcoming much of the harm wrought by wrong preparation, but even in the healthy, normal individual a steady diet of fried food will eventually undermine what is

known as good digestion. In abnormal conditions (illness) frying is a method seldom, if ever, used.

Preparation of Food. — The various methods to which food is subjected in preparation for human consumption may be summed up as follows: boiling, simmering, steaming, baking, roasting, broiling, frying, sautéing.

Boiling is cooking in water raised to the boiling point, 212° F. (sterilizing). This method is commonly used in the cooking of starchy vegetables and cereals, and in the cooking of green vegetables, such as spinach, carrots, beets, corn, asparagus, etc. Stewing is a form of boiling. As a rule water is used, and the vessel is left uncovered, so that as the food is cooked the surplus moisture evaporates, leaving the food tender. Dried fruits, such as prunes and apricots, are prepared by this method.

Simmering is cooking in water, the temperature of which is not raised to the boiling point, but kept between 200° F. and 210° F. This method is used in the preparation of eggs and dishes in which eggs predominate, since proteins are made tough if subjected to a high degree of temperature. Coddled eggs, for example, are prepared by placing the egg in a clean vessel and pouring over it the boiling water, then covering the vessel and allowing it to stand for ten or fifteen minutes. The vessel and the cold egg reduce the temperature of the water to about 185° or 190° F. and in this way prevent a toughening of the albumen of which eggs are chiefly composed. Soups, broths, ragouts, etc., are prepared by this method.

Steaming is cooking over hot water or by steam. This method may be accomplished on the top of the stove in a "double boiler" or in the oven in a deep covered pan fitted with a "rack" to hold the article to be cooked. Either method allows the vessel in which the food is placed to be surrounded by boiling water, but does not insure sufficient heat to raise the food within to the boiling point.

Baking and **roasting** are both brought about in the oven. Bread, biscuits, pies and other pastry, potatoes, cakes, etc., are baked, while meats, roast of beef, lamb, veal, mutton, as well as chicken, turkey, duck, and large fish are roasted. The heat in the oven may be intense. The outside or cut surface of the meat is seared, the soluble albumens are coagulated, thus sealing the juices within. If the meat is placed in a pan surrounded by cold water and then placed in the oven, the juices are "drawn out" in the water. These juices contain the flavoring matter or extractives. Meat so treated is not so palatable or highly flavored as that which has first been subjected to intense heat, the water for the gravy added later.

Frying and **sautéing** is cooking in hot fat. Food may be fried in deep fat, as is demonstrated in the cooking of croquettes, doughnuts, etc., or it may be sautéd in butter or oil in a shallow frying pan or griddle. The latter method is used in making hashed brown potatoes, for example; also in the cooking of griddle cakes, etc.

Broiling. — In broiling or grilling the article to be cooked is exposed to direct heat, either to the blaze or to a very hot surface. The result is the same as in roasting. The outer surface is seared, sealing the juices within. Meat to be broiled is generally cut thinner than that to be roasted. The article, whether it is meat (steak), chops, birds, or chicken, is placed about three inches away from the flames and turned frequently until the surfaces are seared, after which the article is placed in a cooler part of the stove to allow the interior to be cooked. Pan broiling is done on top of the stove. The article to be broiled is placed directly upon a very hot surface, there is no grease used and the meat must be turned frequently to prevent burning.

Poaching. — This term is applied chiefly to the cooking of eggs in a shallow pan of water heated just below the boiling point. To be properly poached an egg must be per-

fectly fresh, or the white and yolks will run together and present an unappetizing, unpalatable appearance.

The following time-table should be used in the preparation of food to insure correct cooking:

TIME-TABLE

Material	*Method*	*Time*
Beef (fresh)	Boiled	4 to 6 hours
Corned beef	Boiled	4 to 7 hours
Shoulder or leg of mutton	Boiled	3 to 5 hours
Shoulder or leg of lamb	Boiled	2 to 3 hours
Fowl (4 to 5 pounds)	Boiled	2 to 4 hours
Chicken (3-lb. hen)	Boiled	1 to 1½ hours
Ham	Boiled	4 to 6 hours
Lobster	Boiled	25 to 30 minutes
Salmon (whole)	Boiled	10 to 15 minutes
Vegetables:		
Asparagus	Boiled	25 to 30 minutes
String beans	Boiled	1 to 2 hours
Dried beans	Boiled	1 to 2 hours
Beets (new)	Boiled	45 minutes to 1 hour
Beets (old)	Boiled	4 to 6 hours
Beet greens	Boiled	1 hour or more
Brussels sprouts	Boiled	15 to 20 minutes
Cabbage (for creamed cabbage)	Boiled	10 to 15 minutes
Cabbage	Boiled	30 to 80 minutes
Cauliflower	Boiled	1 to 1½ hours
Celery	Boiled	2 to 2½ hours
Corn (green)	Boiled	10 to 20 minutes
Onions	Boiled	45 minutes to 2 hours
Oyster plant (salsify)	Boiled	45 minutes to 1 hour
Parsnips	Boiled	30 to 45 minutes
Peas	Boiled	20 to 60 minutes
Carrots	Boiled	20 to 40 minutes
Potatoes (white)	Boiled	20 to 35 minutes
Potatoes (sweet)	Boiled	20 to 30 minutes
Rice	Boiled	20 to 30 minutes
Squash	Boiled	20 to 30 minutes
Spinach	Boiled	15 to 20 minutes
Tomatoes (stewed)	Boiled	20 to 30 minutes
Turnips	Boiled	45 to 60 minutes
Coffee	Boiled	3 to 5 minutes
Beef (ribs or loin, rare) per pound	Roasted	8 to 10 minutes
Beef (ribs or loin, well done) per pound	Roasted	12 to 15 minutes
Beef (rolled, rare) per pound	Roasted	12 to 15 minutes

Time-Table — *Continued*

Material	*Method*	*Time*
Beef (rolled, well done) per pound	Roasted	15 to 20 minutes
Leg of lamb per pound	Roasted	10 minutes
Leg of mutton per pound . . .	Roasted	15 minutes
Mutton (stuffed, forequarter) per pound	Roasted	15 to 20 minutes
Lamb, well done, per pound . .	Roasted	15 to 18 minutes
Veal, well done, per pound . . .	Roasted	20 to 25 minutes
Pork, well done, per pound . . .	Roasted	20 minutes
Chicken, well done, per pound . .	Roasted	15 to 20 minutes
Turkey (8 to 10 pounds) . . .	Roasted	3 hours
Ducks (domestic)	Roasted	1 to 1½ hours
Ducks (wild)	Roasted	20 to 30 minutes
Small birds	Roasted	15 to 30 minutes
Large fish	Roasted	45 minutes to 1 hour
Fish steaks, stuffed	Roasted	45 minutes to 1 hour
Steak, 1 inch thick	Broiled	6 to 12 minutes
Steak, 1½ inches to 2 inches thick .	Broiled	15 to 20 minutes
Lamb chop or mutton chop . . .	Broiled	10 to 15 minutes
Quail	Broiled	12 to 20 minutes
Squab	Broiled	12 to 20 minutes
Spring chicken (broiler) . . .	Broiled	20 to 40 minutes
Shad	Broiled	12 to 15 minutes
Bluefish	Broiled	12 to 15 minutes
Bread (loaf)	Baked	45 minutes to 1 hour
Rolls (risen)	Baked	20 to 25 minutes
Biscuits	Baked	10 to 12 minutes
Muffins	Baked	20 to 25 minutes
Sponge cake (loaf)	Baked	45 to 60 minutes
Layer cake	Baked	20 to 25 minutes
Cookies	Baked	10 to 15 minutes
Custards	Baked	20 to 60 minutes
Steamed brown bread	Steamed	2 to 3 hours
Pastry	Baked	30 to 45 minutes
Potatoes	Baked	30 minutes to 1 hour
Scalloped dishes	Baked	20 minutes
Steamed puddings	Baked	1 to 4 hours
Plum pudding	Baked	2 hours (after steaming 10 hours)

CARE OF ICE-BOX AND CONTENTS

The ice-box plays an important rôle in the preservation of the health and comfort of the family, as well as that of the invalid. Therefore the first consideration is the clean-

liness of it. The old-fashioned boxes were constructed without ventilation. This was clearly a mistake, since many foods absorb both the odor and flavor of the substances about them if allowed to stand for any great length of time in a closed compartment with them. The ice-boxes or refrigerators of to-day have a ventilation system which insures a circulation of air constantly throughout the interior of the box. The drain pipes require special attention, because no matter how clean the box itself is kept, the melting of the ice causes a slime to accumulate on the inside of the pipe which will clog it and become offensive unless it is flushed out often. This may be accomplished by pouring through it a solution made by dissolving one-half ounce of borax, washing soda, or ammonia in one gallon of boiling water. The adjustable part of the pipe can be removed and cleaned with a long brush made for the purpose. The pipe is then replaced and the boiling water poured through. In this way the entire drainage system of the box is completely cleaned. All loose bits of food which may drop from the containers to the floor and shelves should be carefully removed each day and the interior of the box and shelves thoroughly wiped out. Three times a week is sufficient to wash and flush the box and pipes unless milk, cream, or other food materials have been spilled, in which case it should be washed at once before it has an opportunity to sour or spoil and become offensive. Ice should always be washed off before being put in the box, and all milk and cream bottles should likewise be wiped with a clean wet cloth before being placed on the ice.

Hot food must never be put in the ice-box, as the heat from the food will raise the temperature of the air in it. In some cases the sudden chilling of the food itself is undesirable, but this is not so often the case. However, the best results are obtained by first allowing the food to cool,

and then placing it on ice. This is particularly the case with jellies made from gelatin.

Milk and milk products, cream, butter, buttermilk, cheese, etc., meat, fish, and, at times, eggs should be kept in a refrigerator or in a cold place such as the cellar in the country, when it is impossible to procure ice.

Broths of all sorts, beef juice, and meat jellies will sour and decompose unless kept close to the ice. Carbonated waters, such as Vichy, Apollinaris, White Rock, etc., as well as champagne and other sparkling wines, must be kept in a dark, cool place, lying on the side. It is better to put only one or two bottles on the ice at a time, since the wine flattens (loses its sparkle) if it is ever allowed to become warm after once being placed on ice. Koumiss and other fermented milk products must be treated in a like manner to assure having them served at their best.

RULES GOVERNING SELECTION OF FOOD

There are certain fundamental rules to be observed in the selection of our food materials, whether they are intended for those in health or for those suffering from pathological conditions. These rules are definite and obligatory. All food materials must be of good quality; that is, they must be of known purity and cleanliness, and adulteration should not be tolerated. In health the small amount of preservative used in certain canned and bottled foods would probably have little if any effect on the individual, but in sickness this is not always the case. With regard to milk, this point has particular significance. To obviate danger, the nurse should use discrimination in the selection of the dealer from whom the meat, milk, eggs, fruit, and vegetables are purchased, as well as the grocer who supplies the remainder of the food materials used by the patient.

THE CARE OF FOODS AND UTENSILS

The next point of consideration is the care of the food materials. This is quite as important as the selection, for even the best of food may be ruined by careless handling, not only in the preparation, but likewise during the period before it is prepared for the invalid's consumption. The rules governing the handling of food materials before they reach the consumer are subject to inspection by law, but the housekeeper or nurse has no such rules to guard or govern her; hence she may be wantonly careless or ignorantly unsanitary unless taught the right way to care for the food in her charge. Perishable fruits and vegetables must be kept in a cool place to preserve their freshness.

Method of Washing Dishes. — Cleanliness must be observed in the care of all food materials and the utensils in which they are to be prepared. If the nurse will observe the scientific rules governing the solubility of the foodstuffs, she will be able to save herself much time and trouble. For example, it is a known scientific fact that starch is insoluble in cold water and more or less soluble in boiling water, hence it would be a useless waste of time to try to wash a utensil in which a starchy food has been cooked in cold water. Fats solidify under the influence of cold and melt under the influence of heat, so that hot water should be used in conjunction with soap or an alkali to remove grease from dishes and silver and utensils. Albumens are soluble in cold water and are coagulated in hot, therefore to remove milk, egg white, and like protein substances from glasses, spoons, etc., it is advisable to soak first in cold water to wash out the food material, and then to wash thoroughly in hot soapsuds to cleanse and polish. The dishcloths used in the washing and drying of dishes and kitchen utensils should be washed after using in hot soapsuds, rinsed in clear water, then dried in the sun. When this is impossible, they should

at least be hung in the fresh air to make them sweet and clean before the next using. In contagious diseases the care of the utensils and dishes used by the patient is of the utmost importance. They should be thoroughly sterilized before being placed with those used by the rest of the family, otherwise the disease may be communicated to the unaffected members. A word about the handling of glasses and spoons used in administering medicine in the sick-room: It is advisable when possible to keep these separate from those used on the tray, as many medicines have a very lasting and disagreeable taste, which is more than apt to cling to the spoons or glasses in which they are measured and in turn be communicated to the food, making it distinctly unpalatable. This has been found to be the case with asafetida, valerian, ichthyol, etc.

METRIC MEASURE

The metric system is a system of weights and measures expressed in the decimal scale. The principal units with which we are concerned are:

The liter — L.	Cubic centimeter — c.c.
The gram — gm.	Centigram — c.
Milligram — mgm.	

These units have prefixes to show how they are divided decimally, *i.e.:*

deci. — 0.1
centi. — 0.01
milli. — 0.001

Units of Weight

10 milligrams	= 1 centigram	(cgm.)
10 centigrams	= 1 decigram	(dgm.)
10 decigrams	= 1 gram	(gm.)
10 dekagrams	= 1 hektogram	(hgm.)
10 hektograms	= 1 kilogram	(kilo.)
1000 kilograms	= 1 metric ton	

A cubic centimeter of water weighs 1 gram; 30 grams = 1 ounce.

A liter of water weighs 1 kilogram; 1 kilogram of water = 2.2 lb.

Household Weights and Measures

4 saltspoons	=1 tsp.
3 tsp.	=1 tbs.
4 tbs.	=¼ cup or ½ gill
8 tbs.	=½ cup or 1 gill
16 tbs.	=1 cup or ½ pint=8 oz.=240 gm.
2 cups (c.)	=1 pint=480 gm.
2 pints (pt.)	=1 quart (qt.)=a little less than 1 liter
4 qt.	=1 gal.
2 tbs. butter	=1 ounce (oz.)
2 cups butter (solid)	=1 pound (16 oz.)
2 cups granulated sugar	=1 pound
2½ cups powdered sugar	=16 oz.=1 lb.
4 cups flour (sifted)	=16 oz.=1 lb.
1 pt. milk or water	=16 oz.=1 lb.
1 pt. chopped meat	=16 oz.=1 lb.
10 medium size eggs (with shells)	= 1 lb.
8 eggs, without shells	= 1 lb.
2 cups rice	= 1 lb.
4 tbs. butter	= 2 oz.=¼ cup
2 tbs. sugar	= 1 oz.
4 tbs. flour (sifted)	= 1 oz.
4 tbs. coffee (powdered)	= 1 oz.
2 tbs. powdered lime	= 1 oz.
2 tbs. lemon juice	= 1 oz.
2 tbs. orange juice	= 1 oz.
1 glass orange juice	= 8 oz. or ½ pint
2⅔ cup oatmeal	= 1 lb.
4¾ cup rolled oats	= 1 lb.

30 grams=2 tablespoons=1 ounce of the following substances: arrowroot, barley flour, brandy, butter, grape juice, lemon juice, orange juice, molasses, cream, dry peptonoids, liquid peptonoids, milk (whole skimmed), buttermilk, malted milk, rice flour, oatmeal, olive oil, wine.

Materials requiring 3 tablespoons to weigh 30 gm. or 1 oz.:—corn meal, farina, gum gluten flour, Graham flour, white flour.

Material requiring 4 tbs. to weigh 1 oz.: cocoa.

The standard measuring cup holds 8 ounces or 16 tablespoonfuls.

1 c.c.	equals	1 gram (gm.)
5 c.c.	equals	1 tsp.
15 c.c.	equals	1 T.
30 c.c.	equals	2 T. or 1 oz.
240 c.c.	equals	16 T. or 1 c.
480 c.c.	equals	1 pint, 2 c.
1000 c.c.	equals	4 cups, or 1 qt.

The following list shows the approximate weights and measures of the foods comprising dietaries:

Asparagus, 8 stalks, E. P.	= 2 ounces
Apple (1 medium size)	= 5 ounces
Bread, 1 slice, home-made, 3 in. × 3½ in. × ½ in.	= 1 ounce
Bread, 1 slice, baker's, 3 in. × 3½ in. × ¾ in.	= 1 ounce
Bread, 1 slice, baker's, 2½ in. × 2¾ in. × ¼ in.	= 7 ounces
Bread, 1 slice, corn, 3 in. × 3 in. × ½ in.	= 2 ounces
Bread, muffin, 1 small, or biscuit	= ½ ounce
Banana, 1 medium size	= 5 ounces
Chicken, 1 serving	= 3 ounces
Chicken (creamed) 2 tbs.	= 1½ ounces
Cream, 2 tbs.	= 1 ounce
Custard (soft ½ cup)	= 4½ ounces
Custard (baked, ½ cup)	= 4 ounces
Cream (ice, ½ cup)	= 4 ounces
Custard (rice, ½ cup)	= 3½ ounces
Dates (3 medium size)	= 1 ounce
Eggs (scrambled, ¼ cup)	= 2 ounces
Eggs poached, 1 egg	= 1½ ounces
Fish, medium serving, 2½ in. × 3 in.	= 2½ to 3 ounces
Honey, 3 tsp.	= 1 ounce
Hominy (cooked), ½ cup	= 2 ounces
Lamb chop, E. P., 2 × 2 × ½ inch	= 1.6 ounces
Lemon or other jellies, ½ cup	= 3.8 ounces
Steak ((sirloin), 3 × 2½ × ¾ in.	= 3 ounces
Vegetables:	
Beets, 1 medium size (4 slices)	= 2 ounces
Carrots, ½ cup diced	= 2½ ounces
Peas (canned or drained), ⅓ cup	= 3 ounces
Potatoes, baked, sweet, 1 medium size	= 6 ounces
Potatoes, baked, white, 1 medium size	= 3 ounces
Spinach, cooked, 1 serving, ½ cup	= 4 ounces
Tomatoes, 1 medium size—fresh	= 3 to 4 ounces
Soups:	
Cream, ½ cup	= 4 ounces
Clear soup, 1 cup	= 7½ ounces

PERCENTAGE CALCULATION

A percentage of a number is the result obtained by taking the stated number of hundredths of it. The rate per cent, is a fraction whose denominator is 100 and whose numerator is the given number of hundredths; thus 6% of a number is 6/100 of that number.

The method of figuring the per cent. of foodstuffs in a food material is simple. Milk, for example, has a percentage composition of 3% protein, 4% fat, and 5% sugar. To find the definite amounts of these foodstuffs in 1 ounce of milk it is best to reduce the ounce to grams, since the gram is the unit of measurement generally used.

1 ounce	= 30 grams
In 1 oz. there will be 30 × .03 =	0.90 gram protein
In 1 oz. there will be 30 × .04 =	1.20 grams fat
In 1 oz. there will be 30 × .05 =	1.50 grams sugar

THERMOMETRY

There are two scales used in thermometry, the Fahrenheit and the Centigrade. The former is generally used. However, since many of the scientific calculations are made using the Centigrade scale it is wise for the nurse to understand how to translate one to the other.

Centigrade has 0° as the freezing point and 100° as the boiling point, while Fahrenheit has 32° as freezing point and 212° as boiling point. To change Fahrenheit to Centigrade it is necessary to subtract 32 from 212 in order to make the freezing points correspond. This would read $212 - 32 = 180°$ F. $= 100°$ C.; hence a degree Centigrade represents 5/9 of a degree Fahrenheit.

To change Centigrade to Fahrenheit it is necessary to remember that every Fahrenheit degree in 9/5 times as large as the Centigrade and the addition of 32° must also be made. For example: Change 105° F. to Centigrade: $105° - 32° \times 5/9 = 41°$ C. Change 50° C. to Fahrenheit: $50° \times 9/5 + 32° = 90° + 32° = 122°$ F.

CHAPTER V

FOOD MATERIALS AND THEIR PREPARATION

Dairy Products.—Milk, cream, and other dairy products form such an important part of the invalid dietary that they require especial care in their selection. "Certified Milk" is the safest. This is protected by special inspection. The methods and standards governing the production and distribution of certified milk were adopted by the American Association of Medical Milk Commissions, May 1, 1912. The sanitary condition of the dairy, the cleanliness of the vessels into which the milk is placed, the health of the milkers, and a surety that no member of their family with whom they come in contact has any kind of contagious disease, are all obligatory. The feed for the cows and the purity of the water given them to drink must be inspected and made to conform to the standard laid down for certified milk. The milk of sick cows and those having tuberculosis is absolutely condemned. The composition of certified milk is standardized as followed: the fat standard shall be 4%, with a permissible range varying from 3.5% to 4.5%. The proteins shall be 3.5%, with a permissible range varying from 3% to 4%. Certified milk shall not contain more than 10,000 bacteria to the cubic centimeter when it is delivered. This inspection and standardizing necessarily raises the price of certified milk above that of milk not so rigidly cared for, and when the additional expense makes it impossible for the patient to afford certified milk, the only thing to do is to be sure of the reliability of the dealer from whom the milk is purchased and the cleanliness of the dairy from which it is procured. Butter-

milk and butter are the milk products which require some attention as to selection. The former grows sour with age and the odor of advanced fermentation and decomposition is readily recognized. Sweet butter, butter without salt, is less apt to be old when purchased than the salted variety, as the flavor of rancid fat is unmistakable in butter which has not been especially treated.

Milk. — Milk is without a doubt the most valuable food in the invalid dietary, furnishing not only a highly nutritious beverage, but likewise acting as a carrier of additional nourishment when such is necessary. Its form, its lack of definite flavor and odor, all add to its value as a food in sickness. Milk is one of the few foods which includes in its composition all of the chemical combinations known as foodstuffs. The carbohydrates, comprising 4.88% to 5% of the solids in milk, occur as lactose or milk sugar. This sugar belongs to the disaccharide group, and is, in the majority of cases, readily digested by even the most delicate digestive apparatus. This form of sugar lends itself particularly well as a reinforcing agent, and is generally used in such cases as typhoid fever, etc. The fat in milk, comprising 4% of the solids and occurring as butter fat (cream), is made up chiefly of olein and of palmitin, with smaller amounts of stearin and from 5% to 6% of its composition in the form of butyric acid (the fatty acid to which butter owes its name and flavor) and traces of other fatty acids, as well as small quantities of cholesterin, lecithin, and a yellow coloring matter.

The proteins of milk, which form the curd or larger part of the solids, according to Van Slyke[1] are in the form of casein and albumen. There are 3.6 parts casein to 1 part soluble proteins, but these figures vary somewhat at times. Casein is insoluble in pure water, but dissolves readily in water to which an alkali or calcium carbonate is added. The

[1] "Archives of Pediatrics," Vol. XXII, p. 515, by Van Slyke.

soluble protein in the form of lactalbumen is one of the constituents of whey. This substance contains more sulphur than does casein, but no phosphorus.

Whey is the opalescent fluid which remains when the casein is precipitated, and is composed of water 93.8%, total ash 0.44% (König).

Mineral salts, 0.7% of milk, are made up of calcium, potassium, sodium, magnesium, iron, sulphur, phosphorus, and chlorine. Milk is so rich in calcium that it requires only 400 c.c. (or about 2½ cups) to furnish 1 gram of calcium. This is the amount believed to be necessary for the welfare of man each day and this must be derived from food.[2]

Water. — The fluid part of milk is composed chiefly of water, constituting 87% of whole milk.

Milk as a food for infants will be discussed in another chapter.

As has already been said, no food has so far been discovered which could be effectually substituted for milk. There is no food, however, which requires more attention in its selection and care. It is very susceptible to both odors and flavors, absorbing them both readily, as will be found if milk be placed in the same compartment with foods of strong odor and flavor, without being properly covered and protected. This is particularly noticeable with cucumbers, melons, etc.

Milk also furnishes a splendid medium for bacterial growth, and if left exposed to the air, put into unclean receptacles, or kept in a warm place, will immediately become more or less contaminated, after which it is unwise to use it. Sterilization and pasteurization will in a measure overcome the bacterial contamination, but milk purchased from a dairy which is not clean or milked under unsanitary conditions will remain dirty, hence unfit for

[2] "Chemistry of Food and Nutrition." by Henry Sherman.

human consumption. When the morning's milk supply is brought to the house it should be in clean, well-stoppered bottles, but before placing it in the ice-box the tops of the bottles should be carefully wiped off with a wet cloth to remove any superficial dust which may be adhering to them. Every time a portion of the milk is removed thereafter the tops should be again cleansed before the milk is poured out. This is a wise precaution, and often prevents contamination from the hands, etc.

The amount of water in milk prevents its being an adequate food for adults except in certain pathological conditions. However, it furnishes a supplementary food unequaled by any other beverage known. There are fortunately only a few individuals who are unable to drink milk. There are many who fancy they cannot do so, but if the nurse has the ingenuity to utilize some of the various methods whereby milk is made more digestible, it will generally be found that the patient can take it without trouble. In cases of personal dislike, if the milk is flavored or colored or made up into soup, cocoa, chocolate, junket, custards, blancmange, etc., it will usually prove acceptable.

Application of Heat. — A word as to the changes which are brought about as the result of heat as applied to milk. These changes are demonstrated in the two methods commonly used in the preparation of milk known as "pasteurization" and "sterilization." Pasteurization is rather an indefinite term to use, unless the time and the temperature to which the milk is subjected are given. According to Morse and Talbot "the term sterilization should never be applied to the processes used in the preparation of milk for the feeding of infants, because the milk is never rendered bacteriologically sterile by them." [3]

As a rule the flavor and odor of milk are not changed by heat until the temperature reaches nearly to the boiling

[3] "Diseases of Nutrition and Infant Feeding," by Morse and Talbot.

point. A scum then forms on boiling milk, composed of casein 50.86%, fatty matter 45.42%, ash 4.72% (Rosenau). Prolonged boiling changes the color of milk from a creamy white to a yellowish brown which deepens with boiling. This is due to the caramelization of the milk sugar. Cream will not rise (or its rise will be very slow) on milk which has been subjected to a temperature of 150° F. for thirty minutes or more because the fat droplets are broken down so that they cannot hold together at that temperature and become more completely distributed throughout the fluid.[4]

Pasteurization is acknowledged to be preferable to sterilization in milk used for infant feeding because the higher the temperature the greater the change in the chemical composition of the fluid. According to Morse and Talbot [5] the temperature of the pasteurization should be as low as possible. Pasteurization at 140° F. for 20 minutes is sufficient; lower temperatures are not. "At this temperature there is no change in the taste, odor, or color of the milk, no noteworthy changes in the chemical composition are produced, the ferments and bactericidal action are unaffected and bacterial toxins and non-spore-bearing microorganisms are destroyed." [6]

Rosenau [7] states that the bacillus of typhoid, diphtheria, and dysentery, as well as the cholera vibrio and other pathogenic non-spore-bearing bacteria which are often found in milk, are destroyed at a temperature of 140 ° F. for twenty minutes, and at higher temperatures for shorter lengths of time.

Sommerfield's [8] investigations prove that butyric acid

[4] Bulletin 56, Hyg. Lab., Public Health Service, 1908; Circular 153, U.S. Dept. Agric., Bureau of Animal Industry, 1910.

[5] "Diseases of Nutrition and Infant Feeding," p. 173, by Morse and Talbot.

[6] Quoted from "Diseases of Nutrition and Infant Feeding," p. 173, by Morse and Talbot.

[7] Rosenau: Bulletin 56, Hyg. Lab., Public Health Service, 1909; Circular 153, U. S. Dept. Agric., Bureau of Animal Industry, 1910.

[8] Sommerfield: Handbuch der Milchkunde, J. F. Bergman, Wiesbaden, 1909.

bacilli are destroyed at a temperature of 212° F. for from 1 to 2 minutes.

It must be understood that no matter what method is used to insure purity in milk, nothing does away with the necessity for keeping the milk both clean and cold. The receptacles in which the milk is allowed to stand, the vessels in which it is measured, and the person who handles it must be absolutely clean, and the nurse must keep in mind the fact that pasteurization does not completely destroy the bacterial growth in milk, that it merely diminishes it, and she must see that the milk which has undergone the pasteurizing process is kept cold, otherwise the microörganisms which are present, even if to a less extent than in raw milk, will undoubtedly multiply.

Adulteration of Milk. — There is not nearly so much adulteration of milk to-day as there was a few years ago. The stringent laws governing the care and composition of the milk make it unprofitable for the dairymen to practise it. However, there are times when such things are done and care must be taken to prevent it. Milk is, as has already been stated, very susceptible to contamination, and that which is infected with putrefactive bacteria is not fit for food even if the dealer has doctored it with formaldehyde. However, the danger to-day is not so much from drugs as from lack of care in the handling of the milk. It is well to remember, however, that water is an adulteration just the same as formaldehyde and perhaps more pernicious, since the quantities of the latter are so small in an ordinary quantity of milk as not to make a great deal of difference except in the feeding of invalids and children, while watered milk is a swindle not only to the pocketbook but to the body also, since the requisite nutritive value is lacking.

Selection and Care of Milk. — There are a few essential facts to keep in mind in regard to milk: (1) Be sure of the source of the milk supply, especially in the feeding

of the sick and of infants. Milk for such cases should always be purchased from inspected dairies when it is possible. (2) Keep the milk cold; the best milk in the world will spoil if left in a warm place. (3) Always keep the milk bottle well covered, thus eliminating the danger of contamination, flies, etc.

Albuminized Milk

6 ounces (¾ glass) fresh whole milk. 1-2 eggs (whites only).

Have the milk thoroughly chilled.

Clip egg whites with scissors and strain through cheesecloth to remove stringy parts. Now stir into the milk with a fork.

If patient does not object to foam, the mixture may be placed in a milk shaker with pieces of ice and shaken until creamy, then poured over cracked ice.

Albuminized Milk Shake

6 oz. (¾ glassful) fresh whole milk   1 egg white

Place the milk on ice to become thoroughly chilled. Clip the egg white with scissors and strain through cheesecloth to free it from strings; stir into cold milk. If patient does not object to foam, the milk and egg whites may be placed in a milk shaker, and agitated for 4 or 5 minutes, then poured over cracked ice. This beverage may be flavored to suit the taste of patient. Vanilla, caramel, or coffee may be used to give variety.

To add additional nourishment 1 teaspoonful of Sanatogen, or Plasmon may be added, or 1 tablespoonful of Panopepton or liquid peptonoids used instead of the casein products.

Milk and Ginger Ale (or Sarsaparilla)

3 oz. milk 3 oz. ginger ale or sarsaparilla

Pour into a milk shaker and shake with cracked ice until foamy.

Milk Punch

4 oz. rich milk
2 oz. cream
1 tbs. whisky (or sherry)
1 tbs. sugar (or less)
1 egg white (if additional nourishment is desired)

A grating of nutmeg on top. Place ingredients in shaker as directed above, and shake a few minutes to thoroughly mix ingredients. Pour over cracked ice, grate nutmeg or cinnamon over the top. The milk may be peptonized if necessary, using ½ tube of Fairchild's peptonizing powder.

Peptonized Milk

1 pt. of milk 1 tube of (Fairchild's) peptonizing powder

Dissolve the powder in 1 gill of cold water, and place in a clean quart jar (glass).

Pour in 1 pint of cold milk and stop the bottle with cotton, shake well and place the bottle in a saucepan containing water just warm enough to allow of the hand being immersed without being burned (115° F.).

Keep the water at this temperature for 5 to 10 minutes or longer according to the degree of peptonization desired. Lift out of the warm water and plunge into cold, then place at once on ice.

The milk may be poured from bottle into a clean saucepan and brought quickly to a boil to prevent further peptonization; this process, however, is apt to make the milk

very bitter and should not be used unless it is to be flavored with fruit juice.

Peptonized Milk Punch

Take a goblet about one-third full of finely crushed ice, add a tablespoonful of St. Croix rum, a dash of curaçao or any liquor that is agreeable to the taste; fill the glass with "specially peptonized milk," stir well, and grate a little nutmeg on top. Add 1 tablespoon sugar.

Buttermilk (Bulgarian)

1 qt. fresh whole milk (or skimmed if desired)
1½ to 2 oz. (Bulgarian) starter, or 1 buttermilk tablet[9]
If latter is used dissolve tablet in 1 gill of cold water.

Stir the buttermilk starter into the cold milk and place in a one-half gallon glass jar, place the cover on loosely and allow the jar to stand for 12 hours or until the milk is well clabbered. (Insert a thin-bladed knife close to the jar so that the rest of the milk is not disturbed to see if the coagulation is complete.) When this is accomplished place the jar in the ice-box. After the milk has become thoroughly cold, beat thoroughly. The mixture is like any well-made buttermilk. If the cream is removed before adding the culture the milk will be lower nutrient value, but in many cases this is necessary since it is often the fats which cause a disturbance.

ACIDOPHILOUS MILK

1. Heat the fireless cooker soapstone in the oven or on top of the stove. When hot place in the fireless cooker.

[9] Buttermilk Tablets may be purchased from the Chas. Hanson Co. Lab., N. Y., or from Parke, Davis & Co. The Buttermilk Starter is prepared by the first mentioned firm and is ready to use, directions coming with each sample.

2. Measure out the required amount of milk and sterilize in the steamer for 20 minutes; then place in a pan of cold water to cool to 99 degrees F.
3. Sterilize pint bottles, thermometer, and graduate in steamer for 20 minutes.
4. Add 5 to 10 c.c. of pure acidophilous culture to each pint of milk.
5. Pour into pint bottles and cover with four thickness of sterile gauze.
6. Remove soapstone from fireless cooker—test temperature of cooker—should be 100 degrees F.
7. Place the bottles in the fireless cooker, fasten cover, and allow bottles to remain there 24 hours.
8. Bottles of milk should be kept on ice after being removed from cooker.

Cocoa

2 tsp. cocoa	½ cup boiling water
1-2 tsp. sugar	⅔ cup milk

Mix cocoa and sugar together and add boiling water slowly. Boil 3 to 5 minutes; heat milk in double boiler and add cocoa mixture. Beat with Dover egg beater to distribute cocoa and prevent scum forming. Serve with or without whipped cream. Cocoa may be reinforced as directed in "broths" with albumen or the whole or yolk of one egg well beaten. If the white alone is used, care must be observed that the liquid is not hot enough to coagulate the albumen. Proprietary foods and casein preparations are used in like manner.

Plain Junket

⅔ cup milk	¼ tsp. vanilla extract or a grating of nutmeg
½ junket tablet	

1 tbs. sugar

Heat milk to 100° F. Add junket tablet dissolved in 1 tbs. cold water. Mix in sugar and flavoring, and pour into molds to jelly. When junket becomes firm, place in ice until needed.

Junket Ice Cream

½ cup each cream and rich milk	2 tbs. sugar
1 junket tablet	½ tsp. vanilla

Heat cream and milk to 100° F. and proceed as in junket. When mixture is jellied turn into freezer, as any ice cream. This is the most wholesome of ice creams and especially suited for children and patients who have tuberculosis complicated with gastric disturbances.[10]

Plain Vanilla, Lemon, or Almond Ice Cream with of without Egg White[11]

1 cup thin cream	½ tsp. vanilla, lemon extract,
2 tbs. sugar (more if desired)	or almond extract

Method I. Whip cream, add sugar and flavoring, and freeze.

Method II. Scald half the cream and cool. Whip the remaining half, add sugar and flavor and freeze.

Method III. Make "boiled custard," as directed, add one-half the amount of cream and freeze.

To reënforce ice cream:—Add 1 or 2 egg whites, beaten or unbeaten; these may be added in the beginning, or after the mixture begins to freeze. A tablespoonful of maple sirup, caramel sirup (1 tbs. sugar melted and browned and dissolved in 1 tbs. boiling water), or chocolate sirup may be poured over the ice cream to vary the flavor. Make choco-

[10] Recipes for coffee, egg, cocoa and chocolate junket will be found in junket recipes, from the Chas. Hanson Co.

[11] Egg white is frequently added to increase the nutrient value of ice creams and water ices.

late sirup by boiling 2 tbs. water, 1 tbs. sugar, and 1 tbs. chocolate to a sirup. 143.3 calories.

Frozen Custard

1 egg (or 2 yolks)
1 tbs. sugar
⅛ tsp. salt
1 cup of milk
Few drops of vanilla

Prepare as soft custard, freeze.

Malted Milk (1)

3 tbs. malted milk
1-2 tsp. sugar
6 oz. boiling water
¼ tsp. salt, 3 to 5 drops vanilla

Heat water to boiling and mix malted milk (Horlick's) with a little cold water. Stir into the boiling water, add sugar and salt, and serve with or without cream.

Malted Milk (2)

½ to 1 tbs. malted milk
1-2 tsp. sugar
3 oz. each milk and water or ¼ tsp. salt

Proceed as above.

Malted Milk Chocolate or Cocoa

1 tbs. malted milk
1 tbs. cocoa or grated chocolate
6 oz. milk
2 oz. water
1-2 tsp. sugar
4-5 drops vanilla extract

Mix cocoa or chocolate with water and boil 2-3 minutes. Pour milk into a double boiler and heat, mix malted milk with a little water and stir into the hot milk, add the cocoa

paste, sugar, and vanilla, mix thoroughly, beat the mixture briskly to mix ingredients thoroughly, and serve with or without cream.

Milk or Cream Soups

White or Cream Sauce

For soups, sauces, or croquettes.

No. 1. *Average Medium Sauce,* used for white or cream soups made from green vegetable purées (except green peas), also for cream toast, or on vegetables.

No. 2. *Thin,* used for soups made with starchy vegetables such as green peas, potatoes, corn.

No. 3. *Thick,* used for foundation in making croquettes, cutlets, etc.

Standard Recipes

Type	Milk or Cream		Butter or Substitute		Flour (Sifted)		Calories
	Amt. H.h.m.[12]	*Wt. Gm.*	*Amt. H.h.m.*	*Wt. Gm.*	*Amt. H.h.m.*	*Wt. Gm.*	
No. 1	1 c.	240	2 T.	30	2 T.	15	452
No. 2	1 c.	240	1 T.	15	1 T.	8	311
No. 3	1 c.	240	3 T.	45	6 T.	45	675

Method of Mixing.—Heat milk or cream[13] in double boiler, while this is heating, rub together butter and flour to smooth paste, stir into hot milk, continue stirring until mixture begins to thicken, cover and stir occasionally. Cook 15 minutes (if too thick add hot milk or water, or broth as desired), add salt to season (about ¼ teaspoon).

The butter or butter substitute may be melted (but not fried), and the flour stirred into it, the hot milk added and the mixture poured into boiler to continue the cooking.

[12] H.h.m. denotes household measure.
[13] When cream is used the food value must be counted.

Standard Rules for Preparing Milk or Cream Soups

Name	*White Sauce*	*Vegetable Purée*	*Salt*	*Other Ingredients*
Cream of Artichoke	¾ cup No. 1 white sauce	¼ cup puréed artichoke hearts	¼ tsp.	
Cream of Asparagus	¾ cup No. 1 white sauce	¼ cup	¼ tsp.	
Cream of Carrots	¾ cup No. 1 white sauce	¼ cup	¼ tsp.	
Cream of Corn	¾ cup No. 2 white sauce	¼ cup	¼ tsp.	
Cream of Potato	¾ cup No. 2 white sauce	¼ cup	¼ tsp.	
Cream of Peas	¾ cup No. 2 white sauce	¼ cup	¼ tsp.	
Cream of Tomato	¾ cup No. 1 white sauce	¼ cup	¼ tsp.	
Tomato Purée	None	⅓ cup puréed tomato	¼ tsp.	¾ cup broth 2 T. each butter, flour

Method.—To mix, cook vegetables tender, press through sieve. In case of tomato soup add soda to hot tomato puree and stir until effervescence ceases, then add to hot white sauce in double boiler, mix thoroughly and serve at once. For all other cream soups, heat white sauce in double boiler and add vegetable purée, add salt.

Oatmeal Soup

(Other cereals may be substituted, either dry or cooked cereal may be used.)

¾ cup cereal
1½ cups canned or fresh tomatoes
5 cups water
½ large onion
1 green pepper
1 tsp. salt
1½ tsp. sugar

Heat water to boiling point, add rest of the ingredients, cook 1 hour.

Oyster Soup

6 oysters	¾ cup milk
1 cracker (soda) or	¼ tsp. salt
8 oyster crackers	A dash of pepper

Put oysters (and their liquor) into a saucepan, and heat gently; skim thoroughly. Heat milk in separate pan; when very hot add to oysters. Roll the cracker and add to soup just before it is served. Add salt and pepper at the same time.

Eggs

Eggs.—The table shows eggs to have a chemical composition of water 73.7% protein 14.8%, fat 10.5%, and mineral salts (ash) 1.0%. Fuel value per pound, 672 calories. The white of the egg, constituting 57% of the entire weight, is composed chiefly of albumen and water with a small percentage of mineral salts in the form of calcium, potassium, magnesium, sodium, phosphorus, chlorin, sulphur, and iron. Typical albumens are always rich in sulphur, and in eggs the sulphur content is much greater in the egg white than it is in the yolk. The yolk of eggs contains more protein and fat than the white, and less water. The protein of the yolk is chiefly in the form of ovovitellin, while the fats occur as palmitin, olein, and stearin. There is also 5% of coloring matter in the yolk of eggs besides lecithin, nuclein, salts of iron, potassium, magnesium, and phosphorus. The latter mineral salt comprises 1.0% in yolk, while in the white there is only .03%. Eggs have a position in the invalid dietary second only to that of milk. They are nutritious, easy of digestion, and exceedingly palatable if properly selected and correctly pre-

pared. The albumen in the white is very susceptible to the effect of heat. At a temperature of about 135° F. the clear, pale yellowish white begins to change to an opalescent tint, and, as the temperature is gradually increased, the texture changes from a viscid, sticky substance to an opaque, jelly-like mass which solidifies with an ever increasing temperature. Hard cooked white of egg, unless it is very finely divided, is considered difficult of digestion, but if the heat is applied gradually and is not raised to the boiling point (212° F.) there is no reason why the hard cooked white of the egg should not be digested. However, it is unwise to cook eggs in this manner for invalids or children. Any of the other methods, with the exception of frying, which should never be used, is decidedly preferable. Egg albumen is soluble in water and fresh fruit juices, so that it may be used with great success as a reinforcing agent. In fact, the whole egg may be so used, but it is more difficult to diguise the yolk in a beverage than it is the white, and for this reason it is not so adaptable in many cases. Eggs may be cooked by the following methods in the invalid dietary; coddled, soft cooked, poached, creamed, omelet, scrambled, or in custard. Uncooked eggs may be given in water, milk, wine, or fruit juices.

The selection of eggs is equally as important as the selection of other foods. There are "new-laid eggs," "fresh eggs," and just "eggs." The latter are generally storage and should not be used for the sick or for infants. As a rule old eggs will not stand poaching, the whites and yolks mingle and form an unappetizing mass. It does not make any difference whether the color of the shell is white or brown; if the egg is absolutely fresh the white and yolk should be distinct and easily separated, and when they are not it is safer to discard the egg entirely.

Beverages Reënforced With Egg

Orangeade

Juice of 1 orange	Juice of ½ lemon
1 tbs. sugar	Enough water to fill the glass

Sweeten the juice of orange and lemon and pour into a glass filled with crushed ice. Fill glass with plain or carbonated water.

Albuminized Orangeade

Make orangeade as directed in above recipe, without the addition of water. Break the whites of 2 eggs into a saucer and with scissors cut the albumen until free from membrane and strain, stir this into the orange juice and add several pieces of cracked ice. This is both nourishing and palatable, and the taste of the egg cannot be detected.

Albuminized Lemonade

Juice of 1 lemon	1 tbs. sugar
Whites of 2 eggs	

Cut as directed for Albuminized Orangeade. Mix until sugar is dissolved. Pour over a glassful of cracked ice. Fill glass with plain or carbonated water.

Pineappleade

2 oz. (¼ cup) grated pineapple	Juice of 1 lemon
8 oz. (1 cup) cold water or sufficient quantity carbonated water to fill glass.	1 drop of lemon extract or a little of the peel, grated
	1 tbs. sugar

Mix lemon juice, water, and pineapple together; add sugar, if not sweet enough, but the less used the better, in all beverages. Add extract and pour into a shaker with a

few lumps of ice. Shake well to mix ingredients and pour the pineapple over crushed ice. If this proves too much at a time, make half the recipe. Serve in tall thin glasses holding from 4 to 6 ounces after the ice is put in, or serve in punch glasses with small spoons.

Albuminized Grape Juice

Albuminized Grape Juice is made without the addition of lemon juice unless the white grape juice is substituted for the black, in which case add one or two teaspoonfuls to relieve the flat taste and proceed as in Albuminized Orangeade, using 3 oz. of grape juice.

Egg White and Mint

1 egg	1 tsp. lemon juice
2 tsp. sugar	Several sprigs of fresh spearmint

Whip white of egg; add sugar and lemon juice. Crush lower parts of mint leaves slightly and place in glass. Pour mixture over ice in glass; stir well and serve at once.

Fill glass with carbonated water, Vichy, White Rock, Apollinaris, etc. This is especially good when patient suffers from nausea.

Cream, Egg and Vichy

1 egg white	3 oz. (6 tbs.) cream
2 tbs. sugar	A few drops of vanilla extract

Celestine (French) Vichy to fill glass

Whip egg white to stiff froth; whip cream stiff and sweeten, add vanilla; lastly, the egg. Pour over cracked ice and fill up the glass with Vichy.

Coffee

2 tbs. ground coffee	1 cup boiling water
2 tsp. white of egg	¼ cup cold (boiled) water

Mix coffee with 1 tablespoonful of cold water and egg white in small pot (after scalding pot), add boiling water; allow to boil 3 minutes; stir down and add cold water; set pot where coffee will stay hot, but not boil, for 10 to 15 minutes, serve with cream and sugar or use to flavor hot milk.

Plain Eggnog

1 egg	1 tbs. rum
2 tbs. cream	1 tbs. whisky
1 tbs. sugar	

Beat yolk of egg and sugar together; add cream, rum, and whisky. Beat egg white stiff and stir into the mixture; pour into glass with or without cracked ice.

Nutmeg may be grated over top for those who like it.

Coffee Eggnog

Follow recipe for plain eggnog, substituting 2 tablespoonfuls of strong coffee for the rum.

Panopepton or Liquid Peptonoid Eggnog

Is made as directed for plain eggnog, panopepton being substituted for the rum, using 1 ounce instead of 1 tablespoonful. This will probably more than fill a glass, but the whole amount must be made to keep the proportions correct. The whisky may be left in, if desired, or sherry wine may be substituted in its place to give flavor and additional stimulation.

Malted Milk Eggnog

1 egg	1 tbs. sherry wine or whisky
1 tbs. malted milk	½-1 tbs. sugar
4 oz. milk	1 tsp. cream

Mix milk as directed above and chill thoroughly. Beat egg yolk with sugar and whisky or wine and add to the mixture. Beat egg white stiff and stir into the rest of the ingredients. Pour into shaker and shake with cracked ice until thoroughly chilled. The cream may be served on top, or beaten into the eggnog.

Foamy Omelet

1 egg	½ tbs. butter
1 tbs. water	⅛ tsp. salt and dash of pepper

Beat yolk until light colored and thick; add water, salt, and pepper. Beat white until stiff and dry. Turn the yolk over the beaten white and cut and fold the white into the yolk mixture.

Have pan hot and buttered, turn in the mixture, spread evenly in pan and allow to stand about two minutes on the top of the stove at a moderate heat; then remove the pan, place in a moderate oven and cook until a knife thrust into the center comes out nearly clean. Remove from oven, cut across center at right angles with handle of pan and turn over on a hot platter. Omelets may be varied by the use of different garnishes and flavors.

Coddled Eggs

1 pt. water	1 egg

Allow water to boil; wash egg; drop into boiling water and place saucepan where water will keep hot, but not boil; allow to stand 7 to 8 minutes. Serve with salt.

Soft-Cooked Eggs

Proceed as for coddled eggs, but allow egg to remain from 10 to 15 minutes or even longer, if very soft eggs are not desired.

Poached Eggs

Have small, shallow saucepan half filled with boiling water or milk—if an egg poacher is at hand, use that; otherwise, lower a flat perforated spoon into water and place where the water cannot boil. Break the egg carefully into the spoon, taking care not to break the yolk; allow to stand in hot water until the white is of the consistency of jelly; lift out—slide egg on to hot toast, taking care not to break. (A broken poached egg is very unappetizing, as well as untidy in appearance.)

Creamed Egg on Toast

Cut the crust from one slice of bread and cut bread in one-inch cubes; toast while preparing egg. Beat egg with egg beater until light colored; stir into it 2 tablespoonfuls of rich milk; pour into a double boiler, over hot water; add 1 teaspoonful butter, a little salt and pepper; stir until like thick boiled custard. Pour over toasted cubes of bread and serve at once.

Egg Nest

1 egg	1 slice of bread (¾ in. thick)
½ tbs. butter	Salt and pepper to taste

Toast the bread on one side, butter and place on a plate (one which will not break in the oven).

Beat egg white stiff, and pile roughly upon the toast, leaving a slight depression in the center. Slip the unbroken yolk into the depression (take care not to break the egg yolk or the appearance and significance of the dish will be ruined). Set plate in oven to brown the white (the oven must not be too hot or the white will brown before the yolk is sufficiently cooked to be palatable). Place the remaining butter on the yolk, dust with salt and pepper and serve at once.

Soft Custard

1 egg (or 2 yolks)	1 cup milk
1 tbs. sugar	A few drops of vanilla

Heat milk in double boiler. Beat egg and sugar together. When milk has reached the scalding point (small bubbles form around the edge of the saucepan), stir in the egg. Care must be taken not to allow the water under the saucepan to become too hot, as the custard will curdle if the egg is cooked at too high a degree of temperature. The custard must be stirred constantly in the beginning until it begins to thicken, then several times a minute until it is of the desired consistency and the raw taste is cooked out of the egg. This mixture is done when it will form a coating upon the spoon. Serve with whipped cream on top (57 calories extra with cream).

Baked Custard

1 egg	¾ cup milk
1 tbs. sugar	A few drops of vanilla

Beat egg and sugar together, stir into the milk, grease custard cup with butter, pour in the mixture. Set cup on several layers of paper in a deep pan, surround with hot water (to about half its depth). Set pan in moderate oven

and allow to cook slowly until custard is firm in the center. It may be served hot or chilled and turned out, with a tablespoonful of whipped cream on top.

Care must be taken not to allow the oven to get hot, or the egg will coagulate, making a watery, unpalatable, and indigestible mixture.

Caramel Custard

Caramel custard is made exactly the same as baked custard, except that the cup is lined with a caramel made as follows: In a small frying pan, place 1 tablespoonful of sugar, place on the stove and stir constantly until it melts and turns a golden brown (do not allow to burn). Fold a cloth about the custard cup and pour in the caramel, moving the cup about until the sides and bottom are well coated. Pour in the the custard mixture and proceed as in baked custard.

Floating Island

1 egg and 1 extra yolk	2 lady fingers
1 cup milk	Few drops vanilla

1 tbs. sugar

Make soft custard, using the two yolks (no white). Chill custard thoroughly. Line individual ice cream cup with the lady fingers; pour the custard over. Beat the white of egg and place on top. Serve at once. The lady fingers may be dipped in sherry wine if desired, using about 2 tablespoonfuls of wine. (26 calories extra.)

Cereals and Breadstuffs

Standard rules for preparing cereals arranged in tabulated form such as in the following table simplify the work of preparing such foods in the diet laboratory.

Schedule for Cooking Cereals

Type	*Amount Dry*	*Water*	*Milk*	*Salt*	*Remarks*
Cream of Wheat	1 cup	5 cups or 2½ cups plus	5 cups 2½ cups	1-2 tsp.	Cook in water for 5 minutes over direct heat, add milk and cook for 55 minutes in double boiler
Corn-meal mush	1 cup	6 cups		1-2 tsp.	Cook 1 to 3 hours over direct flame. Or cook ½ hour over direct flame and then 3 hours in double boiler. Or cook 10 minutes over flame and overnight in fireless cooker
Farina	1 cup	5 cups or 2½ cups plus	5 cups 2½ cups	1-2 tsp.	Cook in water for 5 minutes over direct heat, add milk and cook for 55 minutes in double boiler
Hominy	1 cup	4 cups		1-2 tsp.	Cook ½ hour over direct flame, and then either in double boiler or on an asbestos mat for 3 to 5 hours
Rice	1 cup	8-10 cups		1-2 tsp.	Cook 20 to 30 minutes in boiling water, wash in cold water, drain and steam in colander ½ to 1 hour
Rice, creamy	1 cup		6 cups	1-2 tsp.	Cook 3 hours in baking dish in oven
Rolled Oats	1 cup	2-2½ cups		1-2 tsp.	Cook 1 to 3 hours over direct flame. Or cook ½ hour over direct flame, and then 3 hours in double boiler. Or cook 10 minutes over flame, and overnight in fireless cooker
Wheatena	1 cup	5 cups or 2½ cups plus	5 cups 2½ cups	1-2 tsp.	Cook in water for 5 minutes over direct heat, add milk and cook for 1 to 1½ hours in double boiler

In cereals that have to cook over an hour, a fireless cooker may be used instead of a double boiler.

Corn Meal Gruel

2 tbs. corn meal | 1 cup water
½ tsp. salt

Allow water to boil, mix corn meal with 3 or 4 teaspoonfuls of cold water. As soon as water begins to boil, stir briskly until gruel begins to thicken. Then place on a cooler part of the stove, and cook gently for 2 hours, replacing water as it evaporates. Strain through a coarse sieve if it lumps.

Rice

1 cup rice | 1 tsp. salt
5 cups milk

Wash rice and place in an earthenware baking dish, cover with the milk, water and salt. Cover and set in the oven; allow to cook until all of the moisture is absorbed (if the rice is not done by the time the moisture has evaporated, add more milk, or milk and water, and continue until the grains are tender). If the given amount of moisture is not absorbed by the time the rice is tender, drain off the surplus and return the dish to the oven for a few moments. Each grain should be separate, when the dish is prepared correctly.

Milk Toast

1 slice bread, toasted | ¼ cup milk, heated
1 tsp. butter | 1/6 tsp. salt

Toast the bread on both sides and butter; place in a deep plate and pour over it the hot milk.

Cream Toast

1 slice bread | 1 tsp. flour
¼ cup thin cream | 1 tsp. butter
¼ tsp. salt

Cream butter and flour together cold, and stir into hot milk. Stir until the mixture begins to thicken, cover the boiler and allow to cook for 15 minutes. Slice the bread and cut into cubes; toast a delicate brown, and pour over it the cream sauce. Strain the sauce if there are any lumps.

Melba Toast

Cut the bread very thin, cutting the long way of the loaf. Make pieces about 2 inches by 5 inches. Put in a pan and toast in a slow oven or in the broiler. This toast should be thoroughly dried out and well browned. This will keep indefinitely if put in a dry place and may be freshened by putting in the oven for a minute before serving. Weigh bread before toasting. If for a nephritic patient use salt free bread.

Rice Muffins

2 eggs	2 teasp. butter (heaping)
2 cups milk	2 teasp. baking powder
1 teasp. salt	3 cups rice flour

Mix as ordinary muffins.

The most satisfactory muffins are prepared with a mixture of rice and rye flours, since the rice flour is rather too dry and the rye too moist.

Rye Flour Raised Biscuits

1 potato, mashed	1 teasp. lard
1 yeast cake	3 level tbsp. salt
3 tbsp. sugar	2½ lbs. rye flour

1 pt. of water in which potato was cooked

Make sponge of potato, yeast and sugar. Let rise one-half hour. Add lard, salt, flour. Knead five minutes and let rise six hours. Put in pans, let rise again and bake forty minutes in moderate oven.

Flour Muffins

1/3 cup of butter	3/4 cup milk
4 tablespoons sugar	1 egg
1/4 tsp. salt	2 cups of flour

4 level tsp. baking powder

Cream butter and sugar together, then add alternately, the beaten egg mixed with milk and the flour sifted with the baking powder. Bake in hot muffin tins (or gem pans) 25 minutes.

This rule may be made sweeter by double boiling the sugar, or it may be changed by adding 1 cup of blueberries, or 1/4 pound of chopped dates or raisins.

Baking Powder Biscuits

2 cups of flour	2 T. shortening (butter or lard, or Crisco)
1 tsp. salt	About 1/2 cup milk
4 tsp. baking powder	

Add salt and baking powder to flour, work in the shortening with knife or tips of fingers, add milk to make soft dough, knead just enough to make dough smooth. Roll on bread board dusted with flour, into a sheet from 1/4 to 1/3 inch in thickness, cut with biscuit cutter, bake in hot oven about 12 to 15 minutes.

Starchy Desserts

Rye Cakes

2 cups rye flour	1 1/2 cups sugar
1 1/2 cups cocoanut, shredded	2 tbsp. cocoa
1 cup milk	1 teasp. vanilla

Bake in cookies.

Oatmeal Cookies

2 cups brown sugar	1 teasp. baking powder
1/4 teasp. salt	2 eggs
1 3/4 cups rolled oats	Butter to equal size of an egg

Cream butter and sugar, oatmeal, and making powder. Mix well. Drop in small portions from spoon into large baking pan. Bake in moderate oven until brown. Do not put close together.

Oatmeal Cookies

2 cups flour	2 tsp. butter, lard, or Crisco
¼ cup sugar	1 cup seeded raisins
½ cup milk	1 egg
½ cup oatmeal	½ cup shelled peanuts

Mix shortening and sugar together. Mix oatmeal and peanuts (broken into small pieces) into the flour. Add milk and well-beaten eggs, then the raisins; mix into a dough, roll into a thin sheet, and cut into small cakes. Bake in quick oven.

Baked Tapioca

1 cup milk (scalded)	3 tbs. sugar
2 egg yolks	6 dates

2 tbs. minute tapioca

Beat sugar and egg together, stir in the tapioca and dates, cut into small pieces. (The dates may be omitted, if desired). Pour mixture into custard cups and bake slowly (as rice custard) until the tapioca is clear and the custard is fairly firm in center.

Orange Tapioca

½ cup milk	2 tbs. minute tapioca
½ cup orange juice	2 egg yolks
¼ cup sugar	6 drops orange extract

Mix and bake as directed in plain baked tapioca custard.

Any other fruit juice may be substituted for the orange, raspberry, pineapple, or grape juice.

Apple Tapioca

1 apple (pared and cored)	2 tbs. sugar
1 egg	1½ tbs. tapioca
¾ cup milk	⅛ tsp. nutmeg

Beat egg and sugar together. Heat milk in double boiler and add egg when milk is scalding hot. Stir in tapioca. Cook 20 minutes. Place apple in cup a little larger than the apple and pour the tapioca custard over the apple. Cover the cup and bake 30 minutes in a moderate oven.

Brown Betty

2 slices bread	2 tbs. sugar
1 large tart apple (or	1 tbs. butter
½ cup blueberries may be substituted for the apple)	½ tsp. nutmeg or cinnamon

Toast bread and break into small pieces, line the bottom of the individual baking dish with toast bits, cover with a layer of apple or berries, sprinkle with sugar and nutmeg or cinnamon, add butter in bits over this, continue the process until the dish is filled, place bits of butter on top of the last layer of toast and set dish in oven; bake about 20 minutes in a slow oven; serve with whipped cream or hard sauce.

Cereal Pudding

1 cup milk	3 tbs. corn starch
4 tbs. cream of wheat, farina, or flour (wheat), or	2 tbs. sugar
	flavoring extract

Mix starch with sugar, or a little cold liquid, stir into boiling liquid, cook to the boiling point over flame, continue the cooking in double boiler until thoroughly done

(usually 1 hour). Serve with custard sauce, fruit sauce, or chocolate sauce.

To change above recipe add 1 tbs. grated chocolate and 1 beaten egg.

Rice Custard

1 tbs. raw rice, boiled	½ cup milk
1 egg	1 tbs. sugar
1 tbs. whipped cream	1 doz. raisins if desired

A few drops of vanilla

Beat sugar and egg together. Stir into the milk, stir in the rice and flavor (add raisins if desired—29 calories). Grease custard cup and fill with the mixture. Bake slowly (in a pan of hot water) until custard is firm in center. Serve with whipped cream.

Orange Rice Custard

2 oz. orange juice	2 egg yolks
2 tbs. sugar	½ cup boiled rice (or
½ cup milk	¼ cup uncooked)

Beat egg, sugar, and orange juice together. Mix milk with rice and stir the two mixtures together. Bake as directed in plain rice custard.

Snow-Balls

¼ cup rice	1 cup milk

¼ tsp. salt

Place in a double boiler and cook without stirring until milk is absorbed and rice is tender. Then either pack in egg cups (wet first so that rice will slip out without break-

ing), or take a square of cheesecloth 8 inches square, dust with flour and place about 4 tablespoons of the cooked rice in center, draw the corners together and tie firmly into a ball. Set the ball in a steamer and steam 1 hour. Remove the cloth gently to prevent breaking the balls. They may be served with custard as a dessert, or as a vegetable with tomato dressing.

Tapioca Custard

1 cup milk	1 egg
2 tbs. tapioca (minute tapioca)	3 tbs. sugar

Flavor with vanilla or nutmeg, or ¼ square chocolate grated. Scald milk. Boil tapioca in hot water until transparent like jelly, using one cupful of boiling water. (If tapioca does not absorb all of the water, pour off the surplus.) Beat egg and sugar together and add with the milk to the tapioca. Pour into a double boiler, and cook until the raw egg flavor has disappeared. Flavor as desired. 43 calories extra with chocolate.

Sponge Pudding

2 tbs. sugar	2 tbs. butter
¼ cup flour	1 cup milk
2 eggs	¼ tsp. vanilla

Sift flour and sugar together and make into a thin paste with part of the milk, heat the remainder of the milk and stir in the flour paste. When the mixture is thick and smooth, stir in the butter, then the beaten yolks and last, the whites (well beaten) are folded in. The mixture is now turned into a baking dish and baked (in a pan of hot water as any other custard) until it is firm in the center and well puffed up and brown. Serve with foamy sauce.

Sunshine Cake

7 egg whites	1 cup sugar
5 egg yolks	⅓ tsp. cream of tartar
1 cup flour (sifted 3 or 4 times)	¼ tsp. salt

Beat whites of eggs until foamy and add cream of tartar; beat until dry and stiff, add the sugar gradually and fold in the well-beaten yolks. Sift the flour and gradually fold into the rest of the ingredients; pour into ungreased sponge cake pans and bake in a moderate oven for 30 to 40 minutes.

Angel Food Cake

4 egg whites	½ cup flour (pastry)
½ cup sugar	¼ tsp. cream of tartar

Whip eggs until foamy and add cream of tartar, whip until stiff and dry, add sugar gradually, then fold in the flour (the flour must be sifted 4 or 5 times).

Pour batter into an ungreased angel food cake pan and bake in a slow oven for 25 or 30 minutes. Care must be taken not to disturb the cake during the baking, or it will fall.

Cereal Pudding

½ cup fine cereal	1 tbs. butter
1 cup milk (scalded)	½ tsp. salt
¼ cup molasses	½ tsp. soda
1 egg	½ cup dates or other dried fruit

Stir cereal into scalded milk and cook until mixture thickens, remove from fire, add rest of the ingredients

except eggs. When mixture has cooled somewhat, add the lightly beaten eggs, turn into a buttered baking dish and steam 3 hours. This pudding may be made without steaming by cooking the cereal and milk in double boiler for 1 hour, then add rest of ingredients and bake 30 minutes.

Sauces for Puddings

Foamy Sauce

½ cup powdered sugar
¼ cup butter
½ one egg yolk and 1 whole egg white
1 tbs. sherry wine or
1 tbs. hot milk
¼ tsp. vanilla

Cream butter and sugar (powdered sugar must be used in this recipe). Stir in the well-beaten yolk, add sherry and pour into saucepan over hot water; stir until thick and creamy, lift from hot water and cool as quickly as possible, fold in the stiffly beaten white of egg and serve over pudding at once.

Wine or Fruit Sauce

1 egg
½ cup powdered sugar
1 wineglass sherry wine or whisky, or
½ glass orange
1 tbs. lemon juice
1 tsp. hot milk

Beat yolk and white of egg separately, add sugar to yolk and beat until creamy, add wine or fruit juice, fold in the egg white and add the hot milk last; serve at once.

Hard Sauce

1 tbs. butter
2 tbs. sugar
½ egg white may be added if desired
½ tsp. vanilla, or ½ tsp. nutmeg

Cream butter and sugar together until there are no lumps or grains in mixture. Beat the egg white stiff and fold into the sugar and butter mixture. Flavor.

Lemon Sauce

½ cup of sugar
1 lemon (juice and rind)
1 tbs. cornstarch
1 cup hot water
1 tbs. butter

Mix the sugar and cornstarch together, stir in the boiling water gradually, cook from 8 to 10 minutes, stirring continuously, then add lemon juice and grated rind, add butter, and serve sauce hot.

Chocolate Sauce

1 cup boiling water
½ cup sugar
1 square chocolate
Pinch of salt
½ tsp. vanilla

Cook all together slowly until the syrup is the consistency of thin cream sauce, just before serving add the vanilla.

This sauce may be made and placed in ice box to be used either for sauce on puddings or ice cream, or to flavor milk beverages.

Meats

Beef, Lamb, Veal, Poultry, Fish and Shell-fish

Meats.—The flesh of animals, poultry and fish comes under the head of meat. These food materials form one of the most important sources of protein in the diet, the foodstuff being in concentrated form easily handled by the digestive apparatus and absorbed almost completely, leaving little residue in the intestinal tract. The chemical composi-

tion of different meats is very much alike, as will be seen in the table, the bulk of the weight being water, while the proteins range from 18.3% (E.P.)[14] in beef to 9.9% in bacon. The fats range from 17.9% in beef to 64.8% in smoked bacon.

The mineral salts or ash, as they are found in meat: "Sodium occurs in the animal body chiefly as chlorid in the fluids and blood, and to a less extent in the other tissues." "Potassium, on the other hand, is much more abundant in the soft solid tissues, in the corpuscles of the blood and the protoplasm of the muscles and other organs." "Potassium sulphate in the blood reacts to some extent with sodium chlorid, forming potassium chlorid and sodium sulphate, both of which are rapidly eliminated by the kidneys." The greater part of the sulphur with which we are concerned in nutrition enters the body by way of the protein, the percentage in lean beef being from 0.95% to 1.00%.[15] Phosphorus in meat occurs as phosphoprotein in the nucleoproteins of cell nuclei, and lecithoproteins in the brain and to a less extent in other tissues as phosphorized fats. Meat is poor in calcium, containing only about 0.01 gram per hundred grams of substance. Meat with eggs yields a considerable amount of what is known as acids in the body.

Quality of Meats.—The *quality* of meat depends upon several factors: *age, sex,* care, feeding, and the length of time it is hung. Cold storage beef is much more apt to be tender than that cut from a freshly killed animal. Animals that are not allowed to run over a large area, but are kept in a small inclosure and fed on fattening foods, produce meat of a high quality. This is because the muscular tissue has not been hardened with exercise. The worked muscle is always tougher than the quiet one. For this reason the tenderloin of beef is more tender than the flank. It is

[14] Edible Portion.
[15] "Chemistry of Food and Nutrition," by Henry Sherman.

situated in the part of the animal that is exercised the least. The tough parts, however, are not lacking in flavor or nourishment, but the manner in which they must be cooked to assure them of being tender deprives them of much of their original flavor. This is demonstrated in broths and soups made from the tough cuts of meat. The extractives from which meat derives its flavor and the soluble albumens are drawn out by the water, and if it is to be used as hash, croquettes, etc., needs to be seasoned, since the broth, while it has taken very little of the actual nourishment from the meat, has deprived it of practically all of its flavor. In making broth or soup, if the meat is covered with cold water instead of hot, more of the extractives will be drawn out and the broth will be more highly flavored and much more stimulating. The color, odor, and freshness of the muscular and fatty tissues of meat are all indicative of their quality. Fresh meat is firm in texture and free from offensive odor. Stale beef and that cut from an old steer exhales a pungent odor of butyric acid. The color of beef should be dark purplish when fresh cut but this changes quickly to a bright red; it should contain preservatives of no kind and must be cut from animals free from all disease. The fat should be of a yellowish white and be crumbly, and should be distributed throughout the muscular tissue and around the organs.

Veal, being the flesh of an immature creature, is not so highly flavored as the flesh of older animals, but the bones and cartilages are softer, and when this meat is used for broth, more of the gelatin (collagen and elastin from the bones and connective tissue) is dissolved out, giving a slightly higher percentage of nutriment in the broth.

Selecting of Chicken and Turkey. — In selecting chicken for the diet of invalids, use only the young birds for broiling, those a few months older for baking and roasting,

and the fowls for soup and broth. To test a chicken for broiling and roasting, select one in which the cartilage at the end of the breastbone is soft and pliable; the pinions (lower part of the wings) and the feet should be soft and readily bent. The breastbone of a fowl is firmer and the wings and feet harder than those of the younger chicken. The young chicken has an abundance of pin feathers while the old fowl has not. In fact, one of the means of differentiating between the old chicken and the young, even if they are practically of the same weight, is the presence of the long hairs instead of pin feathers. The fowl selected for broth should not be very fat, as this fat will melt into the broth, causing it to be greasy and unpalatable. Turkey, even when it is young, is not quite so digestible as young chicken; the fibers are longer and the connective tissue more abundant. Goose and duck are richer in fat and not so desirable as chicken in the invalid dietary. Squab, quail, and young squirrel are all palatable and readily digested. The squirrel must, however, be young, or the flesh will be tough and more difficult of digestion.

Fish. — Fish should be given consideration in the dietary of the invalid since it is a valuable source of protein and readily digested in the majority of cases. As a rule fish is not so well liked as meat, but since it contains a smaller percentage of **extractives** and **purin** bases it is exceedingly valuable in certain pathological conditions. The lean varieties of fish, halibut, flounder, trout, perch, haddock, turbot, whitefish, are more readily digested than the dark fish, which contain a higher percentage of fat. To this latter class belong the bluefish, mackerel, salmon, shad, and herring.

Shellfish.—Of the shellfish, the oyster and the clam are exceedingly useful. The soft parts of the oyster are palatable and easily digested. They are not highly nutritious

but give a nice variety to the diet. When used in broth or for the juice, clams are particularly useful. Many cases of nausea are relieved by the taking of iced or very hot clam juice when they resist other remedies. The necessity of having both oysters and clams absolutely fresh is of the greatest importance, since a type of poison results from tainted shellfish which is exceedingly dangerous.

Pork in the Diet.—Fresh pork is rarely ever included in the invalid dietary save in diabetic diets. Meat from this animal must always be thoroughly cooked, not only because underdone pork is exceedingly indigestible but because there is an infectious bacterium sometimes found in pork which is only destroyed by thorough cooking of the meat. Well-cooked bacon is digestible if the surplus fat is poured off instead of allowed to soak into the cooked bacon. The most efficient method of cooking bacon is to place the strips upon a broiler under the flame. In this way the hot fat drips down into the pan beneath, leaving the bacon crisp and delicate.

The meats to be used for the invalid must be selected with care. The quality of this item of food is most important. It is not always necessary to purchase the most expensive cut. If it is to be broiled or roasted then it is necessary to select parts of the animal which are tender, but for broths, soups, scraped or ground meat, or the meat to be used for the juice only, it is wasteful to buy these tender, expensive pieces when those costing less will serve the purpose equally well. The names given to the different cuts vary slightly in different parts of the country, but those in general use only will be mentioned here. The following table shows the manner in which the beef is cut and the method in which it is generally used:

TABLE

Beef	*Cut*		*Method of Preparation*
Hindquarter	Round	more or less free from fat	Broth, soup, beef juice, scraped beef.
			Hamburg steak (ground meat)
		round steak	Broiled (this is a cheaper and less tender cut than the loin steaks).
	Rump	steak	Broiled, cheaper cut steak.
		roast	Roasted, cheaper cut roast.
		lean meat	Broth, soup, beef juice.
	Loin	3 ribs, 1st, 2d and 3d cuts	Roasted.
		sirloin steak	Broiled.
		porterhouse steak	Broiled.
	Tenderloin	steak	Broiled.
		roast	Roasted.
		fillet	Broiled or roasted, larded or plain.
	Ribs (prime)		Roasted.
	Ribs, chuck roast or steak		Roasted or broiled.
Forequarter	Brisket		Corning.
			Broth, soup, scraped, meat juice.
			Hamburg steak.
			Salisbury steak.

Cuts of Lamb and Mutton

Lamb	Neck	Soup, broth, etc.
	Chuck (including shoulder ribs). Shoulder chops are not so tender as loin chops.	Broiled.
	Flank	Soup, broth.
	Loin (chops)	Broiled.
	Leg	Roasted.
Veal	Neck	Soup, broth.
	Chuck	Soup, broth, roast, broiled.
	Cutlets	Broiled (breaded or plain).
	Chops (rib)	Broiled.
	Breast	Roasted, stuffed or plain.
	Leg	Roasted.
	Hind shank, Fore shank (veal knuckles)	Soup, broth.

Broths and Soups

Standard Broth
Beef, Veal, Mutton, or Chicken

1 Pint, 80 calories with rice or barley 105 calories

Two pounds of meat (beef, mutton, veal, or chicken); 2 quarts of water; 2 pounds of bones; 1 teaspoonful of salt; 2 tablespoonfuls of rice or barley may be added if desired and parsley or celery may be used to give the additional flavor.

Wipe meat with a clean wet cloth and cut into small pieces, break the bones, place all together in a deep saucepan, cover closely and allow to stand in a cool place for one hour; then place pan on the back part of the stove, or on an asbestos mat over a gas burner, and heat gently to the boiling point (broth must never do more than simmer), allow to simmer for three or four hours, skim, strain, and cool. When thoroughly cold, remove all of the fat, using blotting paper to absorb the fine particles of grease. If parsley and celery are to be used to flavor the broth they may be added during the last hour of cooking. Barley requires to be soaked overnight when it is used in broth; rice should be soaked one hour. When either are to be left in the broth it is better to cook the broth for three hours, strain, return to the fire, adding the rice or barley. Allow it to simmer for an hour or more and proceed as directed. When the broth is taken from the fire, it should be measured, and boiling water added to bring the amount up to the original quantity. This will give what is known as standard broth. Bouillon is clarified broth, most of the already small amount of nutrient material being thus strained and cleared from the broth, leaving a liquid of practically no fuel value.

Vegetable Soup

1/4 lb. beef, lamb or chicken	1 tbs. pearl barley
1 potato	2 tbs. rice
1 carrot	2 qts. water
2 stalks celery	1 pinch salt

Finely divide the vegetables. Add the vegetable, barley and rice to 2 qts. of water. Boil down to 1 qt., cooking 3 hours. Add pinch of salt. Pass through fine sieve.

Clam or Oyster Broth

1 doz. clams or oysters	1 pt. water or
1 tbs. whipped cream	1 cup each milk and water

A dash of pepper

Scrub clams and place in an iron spider and allow to heat gently until the shells open. (When oysters are used allow to heat until the edges curl.) Chop, cover with hot water, and allow to simmer 15 minutes, strain through cloth, add salt and a dash of pepper. If milk is to be used in place of part of the water, add it during the last 5 minutes of the cooking. Clam broth without milk may be served hot or cold; it will not jelly as other broths but may be frozen if desired.

Clam Broth

1/2 cup (4 oz.) clam juice	Salt and pepper to taste
1/2 cup hot water or milk	1 tbs. whipped cream

Mix clam juice (bottled) with water; heat, add salt and pepper, pour into cup, place whipped cream on top, and serve at once.

Beef Juice

One-fourth pound lean beef. Wipe clean with damp cloth, cut in inch pieces and sear on a hot griddle, place

in a meat press and remove all juice from meat. Care must be taken not to cook the meat. The juice may be reheated by placing in a hot cup in hot water, not allowing the temperature to exceed 155° F.

Chicken Jelly

½ small chicken	1 tbs. gelatin soaked in ¼ cup cold water
3 pt. water	½ tsp. salt
½ cup celery	¼ tsp. red pepper
1 sprig of parsley	

1 egg white

Cut the chicken in pieces, break the bones, place in a saucepan with all of the ingredients except the gelatin and egg white, cover with the water and boil until the meat falls from the bones. Press out as much of the juice as possible, strain and allow to cool, remove all of the grease, and return to the fire. Reduce to 1 pint, add the gelatin, stir in the beaten egg white, and allow to boil 5 minutes, strain again into molds and set aside to congeal.

Calf's-foot Jelly

2 small calf's-feet	1 lemon
½ small fowl	½ stick of cinnamon
1 cup of Rhine wine	1 egg white (well beaten)

Cut the fowl and the calf's-feet into small pieces and place them in a saucepan with 3 pints of cold water and the cinnamon. Cook until the meat falls from the bones (the quantity should be reduced to 1 pint). Strain and squeeze out as much of the juice as possible, allow to cool, and remove all of the grease. Add wine and lemon juice (and sugar if desired) and reduce the amount of broth one-half, add the egg white and allow to boil 5 minutes. Clear and strain into molds.

Game and Poultry

Broiled Quail or Squab

Split down the back and place on the broiler, cut surface uppermost. Or place upon a hot pan, cut surface next to the hot surface so that the cut side may sear quickly, thus keeping in the juices instead of having them wasted in the pan by slow cooking. The process requires about 15 to 20 minutes. Serve on toast, with butter, pepper and salt.

Smothered Birds

Quail or squab cooked inside the stove is often more palatable than that cooked on a broiler. The bird is split as for broiling, and placed in a small pan just large enough to hold it; a strip of bacon pinned about the breast; add 1 tablespoonful of butter in bits, dust the cut surface first with salt and pepper, then with flour; add ½ cup of hot water. Turn another pan over the bird (it must fit closely to keep in the steam), place inside the oven and cook about 10 minutes; turn the bird over and cook 10 minutes longer. Lift the bird from the pan and place it where it will keep hot, add a tablespoonful more water and a teaspoonful more flour to the gravy in the pan, stir briskly to remove any lumps, remove bacon and place the bird upon a slice of nicely browned toast; pour over it the gravy, garnish with a sprig of parsley, and serve at once. Chicken may be substituted for birds.

Birds à la Bain Marie

1 small chicken, or bird
2 tbs. butter
1 tbs. parsley
Salt and pepper

Split birds or chicken as for broiling, place one-half in a chafing dish or double boiler (bain-marie), dot the cut surface with butter, sprinkle over it the parsley, dust with

pepper and salt; place the other half of the chicken or bird on top of this, add the rest of the butter, dust with salt and pepper, cover, and place the pan over the hot water pan; allow to steam for about 1 hour, lift from hot water pan and place in oven or under the flames to brown lightly. Serve on buttered toast.

Chicken (one-half)

Split small chicken (broiler) down the back, flatten the breast bone with knife before placing upon the broiler, proceed as in broiling birds, allowing from 25 to 30 minutes for the process. Chicken is very palatable and dainty if cooked after the manner described in cooking quail and squab inside the stove. The process is called smothering. Serve upon buttered toast, garnished with parsley.

Roast Chicken, Turkey or Duck

Draw the fowl and wash thoroughly inside and out. (If it is purchased from the market, it is well to wash the inside with soda water to remove any stale flavor that may be present.)

Make a dressing from one-third of a small loaf of bread broken into small pieces; ¼ cup chopped celery, 1 tablespoonful of chopped parsley, 1 tablespoonful of butter and one egg beaten lightly. Stuff the cavity with dressing, sew up the opening and place in dripping pan. Place pan under the flame for a few minutes to brown, unless a regular roasting pan (savory roaster) is used; allow to bake from 45 minutes to an hour and a half for chicken and duck according to the size, and from an hour and a half to three hours for turkey according to size. A cupful of boiling water may be poured into the pan in which the chicken, etc., is being roasted and flour may be sifted over the top; dust with salt and pepper. When an ordinary pan is used for baking, the fowl will require frequent basting to keep it

moist and tender. Just as the baking is finished, more butter, flour, and seasoning may be added, with a cup or more of boiling water to make additional gravy.

Sweetbreads

¼ set of sweetbreads	½ tsp. of salt
1 lemon	¼ tsp. of pepper (red)

Wash sweetbreads carefully and alloy to stand 1 hour in ice water, allow the water containing the lemon juice, salt and pepper to come to a boil and drop in the sweetbreads, cook for 15 to 20 minutes or until tender when pierced with fork. Remove from hot water and pour ice water over them to blanch. Serve either in cream sauce or split in half and broil upon a slightly greased broiler until light brown; season with a dash of salt and pepper.

Beefsteak

3 inches long by 2 inches wide by 1½ inches thick (weighing about 3 ounces).

Wipe steak off with a wet cloth and dry before cooking. Slightly grease the broiler and place under the flame, count ten as the clock ticks and turn the steak over, count ten again and again turn; continue this for about 3 minutes or until the steak is seared upon both sides, lift the broiler to a lower part of the oven and continue the cooking for 5 to 8 minutes; run a sharp-pointed knife between the meat and the bone (if the steak is a porterhouse or sirloin), and if the flesh is red, continue the cooking a minute or more. If it is pink, lift to a hot plate, place 1 teaspoonful of butter upon it, dust the surface with salt and pepper and serve hot. Pan broiling is done on the top of the stove in a flat frying pan. Wipe the pan with a clean wet cloth, place upon the stove and heat piping hot, and place the steak (without greasing the pan) upon the hot surface. Proceed

as in broiling under the flame. After the first 3 minutes of cooking, place the pan on a cooler part of the stove to finish the cooking.

Lamb or Mutton Chops

1 to 2 inches thick will require from 10 to 15 minutes' cooking. Scrape the bone clean and wrap in paper or dough to prevent the bone from becoming charred. Proceed as in cooking beefsteak.

Veal Cutlets

Dip cutlets first in egg (mix one yolk with 1 tablespoonful of water) then in bread crumbs; pan broil (grease the frying pan slightly), or broil under the flame as directed in cooking beefsteak. VeVal cutlets may be served plain, or with tomato sauce.

Cutlets or chops may be cooked in paper bags if desired. Wrap the chop in a thin slice of bacon, grease the paper (a piece of heavy brown paper), place the chop inside and secure the ends with paper clips or pins; place in a pan and cook in the oven, or under the flame. It is wise to slip the bag containing the chop inside of another bag; in this way the meat will not taste of scorched paper if the outer bag should burn.

Bacon (1 Slice)

Place bacon on a rack and place rack in a dripping pan, set in oven and bake until crisp and brown. Or, arrange bacon on broiler, place pan beneath to catch the drippings and prevent the fat from catching afire, broil as beefsteak.

Garnishes

When steak or chops are served, parsley or sliced lemon

may be used as garnishes. Chops may be served garnished with green peas, and the beefsteak served with potatoes cooked in any way; all meats should be served very hot. It is best to cover with a plate.

Fish Steaks, Stuffed with Oysters

Halibut, trout, or any good baking fish,
235.8 calories (*about*)

2 slices of fish	1 cup bread crumbs
1-1½ in. thick	4 tbs. butter
1 doz. oysters	Salt and pepper

Lay fish for one hour in a French dressing made from ½ cup of oil, ⅓ cup of vinegar, salt and pepper; drain and place upon slices of bacon, placed upon a fish sheet or dripping pan. Dip oysters first in melted butter, then in bread crumbs, and place upon the slice of fish, adjust second slice above, cover top with bread crumbs, dot with butter and bake 30 to 45 minutes in moderate oven. Serve with hollandaise sauce.

Broiled Oysters

6 oysters	1 slice toast
2 tsp. butter	Salt and pepper to taste

Grease broiler or hot frying pan slightly, place oysters upon the heated surface and place under the flame or on top of the stove; cook until the edges curl (2 to 3 minutes), lift to a hot dish containing the butter, place toast upon small plate (toast and plate must be hot), dispose the oysters upon the toast, and pour over them the butter.

Lobster or Crab

1 lobster, or	1 tbs. butter
1 crab	2 tsp. butter
2 tbs. bread crumbs	¼ tsp. salt
⅛ tsp. pepper	

Boil lobster or crab until bright red, lift from boiling water.

Split lobster down the back and carefully remove cord, gall sack, and sand bag before broiling or serving. Serve with melted butter.

Pick meat from shell of crab, and mix with salt, pepper and butter. Stuff into shell. Cover top with bread crumbs, and brown in the oven.

Hollandaise Sauce

1 egg (yolk only)	1 tbs. butter
2 tbs. lemon juice	¼ cup boiling water
Salt and pepper to please	

Beat egg yolk with lemon juice; add one-half the butter; place in double boiler over hot (not boiling) water. Stir until it begins to thicken and add remainder of butter; stir in boiling water, cook until of the consistency of boiled custard.

Vegetables and Fruits

Among the plants known as vegetables, some are seeds, some leaves, some stems or bulbs, some roots or tubers, and some are the fruit surrounding the seeds. Under the head of seeds we find peas, beans and lentils, this class of vegetables being spoken of as legumes or pulses; they are rich in

protein (especially when dried) and contain an appreciable amount of carbohydrates as well, some contain fat. Green, or fresh legumes are more easily digested than the dried legumes. They are important sources of iron and phosphorus and contain a certain amount of calcium; in the body they act as neutralizing agents since the base forming elements in these plants predominate over the acid forming elements.[16]

Among the "leafy vegetables" we find, lettuce, cabbage, spinach, beet, turnip and mustard greens, chard and parsley. These vegetables are not only prized for their mineral content but furnish a recognized source of the fat soluble vitamin, "A."

Tomatoes, squash, cucumbers and pumpkin are vegetables whose "fleshy fruit" surround the seed but are eaten as vegetables instead of as fruit.

Potatoes, carrots, parsnips, onions, beets and turnips are among those whose stems, roots or tubers are eaten as vegetables.

More and more are we coming to see the importance of this class of foods in the dietary, they are important on account of their mineral salts, their vitamin factors and for the bulk which they lend to the food mass which facilitates its passage along the digestive tract. The majority of vegetables furnish organic acids or their salts which function in the body, as potential bases, assisting in the neutralization of the acids formed in the body as a result of the breaking down of the proteins.

Fruits.—Fruits have practically the same value from a dietetic standpoint as vegetables, and the same care must be given to their selection. Some fresh fruit should be given to children every day to safeguard them against scurvy. And adults should have fresh fruit several

[16] "Food Products," by Henry Sherman.

times a week, the remainder of the time dried fruits may be used. Canned fruits while good are not so valuable as fresh fruits and are more expensive than the dried fruit.

The **fruits and vegetables** will here be considered. Some of the fruits and vegetables contain high percentages of sugar, aside from the mineral salts, for which they are especially valuable. This class includes the sugar cane, sugar beet, raisins, dates, figs, etc., while others such as the potato, taro, banana, etc., furnish an appreciable amount of starch. All of the vegetables and fruits are rich in mineral salts, which are as important to the work of the body as the proteins, carbohydrates, and fats. Hence it is essential to add the foods containing these mineral salts to the daily dietary both in health and in disease.

Both fruits and vegetables should be free from blemishes. Those to be served raw, such as lettuce and other salad vegetables, must be purchased from reliable markets. Unscrupulous vendors have been known to sprinkle old wilted vegetables, to restore their freshness, with water from stagnant pools teeming with typhoid bacteria, thereby spreading infection broadcast. Vegetables which require cooking before they are eaten are, for this reason, safer.

Canned foods should be avoided in the diet of the invalid whenever it is possible; but, when it is not, care should be observed that no can is used in which there is the least sign of fermentation. Beans and peas are sometimes artificially colored, but this custom is not so prevalent now as it used to be.

Peas

½ cup fresh peas	1 tsp. butter
1 pt. boliing water	¼ tsp. salt

Add salt and peas to boiling water; allow to cook from

30 to 60 minutes, or until they are perfectly tender, drain and add butter and additional salt if necessary, or 1 tablespoonful of cream sauce. In gastro-intestinal disorders and with young children, it is best to press peas through sieve or remove the indigestible parts.

String Beans

1 cupful of string beans (measured after the strings are removed and the beans cut into small pieces)

1 tsp. butter ½ tsp. salt

Cover with boiling water and cook until tender, drain, and serve hot.

Spinach

½ lb. spinach ½ tsp. salt
2 tsp. butter

Wash thoroughly through about ten waters, until spinach is entirely free from grit, remove the tough stems, lift the spinach from water and place in a saucepan without additional water, sprinkle over with salt, cover saucepan and cook until tender (requires about 5 minutes). Cut very fine with sharp knife, or press through sieve, add butter and serve hot.

Carrots (with Cream Sauce or Butter)

Carrots, about ½ cupful after they are cut in cubes, or 3½ ounces.. Serve with 2 tablespoonfuls of cream sauce, or with 2 teaspoonfuls of butter and a little salt and pepper.

Scrub carrots and scrape off the spins; cut into slices or cubes, drop into slightly salted boiling water and cook until tender; drain and add butter or cream sauce.

Baked Potato (White)

1 potato weighing about 3 ounces; scrub well with a brush; dry and slightly grease surface, place in moderately hot oven and bake about 45 or 50 minutes. (The potato should feel tender upon pressure.) When done, make an incision of 1 inch in the skin and gently press out the steam; cover closely with cloth and keep in a warm place until ready to serve. Put teaspoonful (about 1/6 ounce) of butter in the cut and serve very hot.

Creamed Potato

¼ tsp. salt
1 medium size potato
2 tsp. milk
1 tsp. butter

Pare and boil potato until tender when pierced with a fork; drain off the water and return the saucepan to the stove; shake the pan (to prevent burning) until the potato looks dry; mash with fork or potato ricer, add milk, butter, and salt. Beat briskly until creamy. Serve at once or brown in oven.

Potato Stuffed with Meat

1 potato (baked)
¼ tsp. salt
1 tbs. cold chopped beef
1 tsp. butter
Dash of pepper

Bake potato, split in half and remove the contents, mix

with the chopped meat, add salt, pepper, and butter; return to the two halves, set in oven to brown, then serve at once.

Scalloped Potatoes

1 potato	¼ cup milk
2 tsp. butter	

Boil potato, not quite tender, and slice in moderately thin slices; arrange in layer in an individual earthenware baking dish (ramekin), add butter in bits between layers, pour the milk over; set dish in oven, cover and bake slowly for 15 minutes, until most of the milk is absorbed and the potatoes are nicely browned on top. In cases where the patient is allowed cheese, 2 teaspoonfuls may be sprinkled between the layers, giving 31 additional calories.

Whole Tomato Stuffed with Rice

1 medium size tomato	1 tsp. butter
2 tbs. rice (uncooked)	Dash of pepper and salt

Remove the center from the tomato, dust the inside with salt and a very little pepper and set aside. Boil the rice, when about half done (10 minutes) add the tomato pulp, from center of tomato. Cook 10 minutes longer, drain the water from the rice, add the butter, salt, and a little pepper. Fill the center of tomato with rice. Set the tomato upon a greased paper and bake in a moderate oven for 20 minutes.

Broiled Tomatoes

Slice 1 tomato in three or four slices	1 slice of bread (round preferred)
1 tbs. butter	¼ cup of cracker crumbs
Salt and pepper	

Heat broiler or frying-pan very hot, grease lightly; season crumbs with salt and pepper; dip slices of tomato in cracker crumbs, covering both sides well, and place upon the broiler; when one side is browned, turn over carefully, to prevent breaking, and allow the other side to brown. Lift the broiler to the lower half of the oven and let the tomatoes cook gently for 10 minutes. Place bits of butter upon each slice, then arrange these on the buttered toast.

Stewed Tomatoes on Toast

½ cup canned tomatoes	1 slice bread
½ cup water	2 tsp. butter

¼ tsp. salt

Pour tomatoes and water in a saucepan and allow to cook slowly for 20 minutes, add salt and a dash of pepper. Toast and butter the bread, pour the cooked tomatoes over it and serve at once.

Vegetable and Fruit Salads

Tomato (No. 2)

Remove skin from 1 medium-sized tomato, remove pulp, fill cavity with following mixture.

½ medium stalk celery	The tomato pulp
1 tsp. mayonnaise dressing	

Cucumber

½ cucumber (7 in. long)	1 tsp. olive oil
½ tbs. vinegar	1/6 tsp. salt

Few grains of pepper

Slice cucumber in thin slices and allow to stand thirty minutes in ice water, drain and serve with French dressing.

Tomato (No. 1)

Wash tomato carefully, cut in shape of flower by cutting almost through the tomato making six sections. Place on lettuce leaf and serve with dressing.

1 tsp. mayonnaise	1 tbs. French dressing

Fruit Salad (No. 1)

3 grape fruit	¼ head of lettuce
1 cup celery (chopped)	1 cupful of mayonnaise

Remove skin and inner membranes from grapefruit, mix with celery and mayonnaise. Serve on lettuce. This salad may be poured into a tin (baking powder can, or mould), packed in ice and salt and frozen. Then served in slices upon lettuce.

Fruit Salad (No. 2)

1 cup of grapefruit	1 green pepper (1 oz.)
1 thick slice of pineapple (chopped)	1 cup of celery
	1 cup of mayonnaise or French dressing

If mayonnaise is used the mixture may be frozen. If French dressing is used, serve on lettuce without freezing.

Tomato Jelly

1 cup tomatoes (canned)	¼ cup vinegar
¾ cup water	1 tbs. of parsley
6 cloves	½ tsp. red pepper
½ cup celery	1 tbs. granulated gelatin soaked in ¼ cup cold water

One slice of onion may be added if there is nothing to contra-indicate it, but care must be taken in adding onion, as it is apt to disagree with many people. Boil all of the ingredients together (except the gelatin) for 20 minutes, press through a sieve, then through a cloth, return to the stove and allow to boil up; add the gelatin and boil 5 minutes; strain into wet molds.

French Dressing

1 tbs. oil ⅓ tbs. vinegar, or lemon juice
Dash of pepper and paprika

Have all ingredients cold; mix salt and pepper together; stir in the oil, add vinegar or lemon juice slowly, beating briskly to form an emulsion; use immediately or ingredients will separate.

Use as little salt as possible in nephritic conditions.

Mayonnaise Dressing

1 egg (yolk only)	½ tsp. mustard (dry)
2 tbs. lemon juice (or vinegar)	Dash red pepper
½ tsp. salt	1 cup olive oil

Method of Mixture: Mix dry ingredients with yolk of egg thoroughly; add all the acid (use Dover beater). Now add, one teaspoonful at a time, the olive oil; beat continually until the mixture thickens (after 8 teaspoons of oil have been added). Put in oil by tablespoonfuls until

all is incorporated. This metrod shortens the time of making at least one-half, and the dressing rarely curdles as it often does in the old methods.

Whipped cream may be added to dressing before serving. Mayonnaise will keep if placed in a cool place, and the above quantities are more easily handled than smaller amounts.

Gelatin Jellies

Lemon Jelly

2 lemons (juice only)	1 tbs. cold water
¼ cup sugar	1 egg white
3 tsp. granulated gelatin	1 cup boiling water

Orange Jelly

3 tsp. granulated gelatin	6 tbs. lemon juice
1 tbs. cold water	3 tbs. sugar
¼ cup boiling water	2 drops orange extract

½ cup orange juice

Grape-Juice Jelly

¼ cup boiling water	1 tbs. cold water
½ cup boiling grape juice	1 tbs. lemon juice
3 tsp. granulated gelatin	3 tbs. sugar

Method for Fruit Jellies.—Soak gelatin in cold water about 2 or 3 minutes, then pour over it the boiling liquid; add sugar and fruit juice; strain through cloth into wet molds. . Set in cold place to stiffen; when firm, unmold. Serve with whipped cream, or pour liquid into baskets made from oranges or grapefruit hollowed out and the edges scal-

loped, or pour into shallow pans, and cut in ½-inch blocks when firm, and serve on a bed of whipped cream.

Wine Jelly

½ cup boiling water
3 tbs. sherry wine
1-inch piece of cinnamon
1 tsp. lemon juice and the yellow rind from ¼ lemon
3 tbs. sugar

Method for Wine Jelly.—Put water, wine, lemon juice, peel, cinnamon, and sugar into a saucepan, allow to boil 5 minutes, pour over gelatin (which has been soaked in cold water). If jelly looks cloudy return to saucepan, and add ½ egg white beaten stiff, allow to boil 1 minute, stirring constantly, and strain into mold. Serve with whipped cream.

Water Ices

Lemon

2 lemons (juice only)
¼ cup sugar
1 egg white
1 cup water

Orange

½ cup orange juice
1 lemon
¼ cup sugar
1 cup water
¼ tsp. orange extract
1 egg white

Grape Juice

½ cup grape juice
1 tbs. lemon juice
¼ cup sugar
1 egg white

Method of Mixture

Mix sugar and water and boil to a rich sirup (about 15 minutes), cool, and add fruit juice (and extract when it is used). Pour into freezer and surround with a mixture of 1 part salt and two parts ice. When sherbet is about half frozen, stir in the stiffly beaten egg white and continue the freezing until mixture is hard. In diseases where it is found inadvisable to give albumen, 1 teaspoonful of gelatin may be substituted.

Apricot

½ cup apricot purée	¼ cup sugar
1 cup water	1 tsp. granulated gelatin

1 lemon (juice only)

Make sirup of water and sugar, soak gelatin in a little cold water and add to the hot sirup; press apricots through a sieve and add to the sirup as soon as it is cool; freeze as directed in other ices.

Strawberry and Raspberry

1 cup fruit juice	⅓ cup sugar

Juice of 1 lemon and 1 egg white. Proceed as in other ices.

Currant

1 cup fresh currants	½ cup sugar
1 cup water	1 tbs. lemon juice

Wash currants carefully and place in a saucepan on a warm but not hot part of the stove, allow to heat gently until the currants are soft, press through a cloth, and add

the water and sugar; stir until dissolved (or make a sirup of the water and sugar and add the currant juice and lemon and freeze as directed in other ices). The egg white may be added if desired.

Lemon Cream, or Milk Sherbet

3 cups (24 ounces) milk	1 cup cream (8 oz.)
4 lemons	¾ cup of sugar

Mix cream, milk and ¼ cup of sugar and pour into freezer, freeze until half frozen (mushy). Add juice of 3 lemons and 1 whole lemon (peel and pulp) shaved into very thin slices sweetened with remainder of sugar (if not sufficiently sweet add more sugar and make allowances for same in fuel value). Continue the freezing until sherbet is of the right consistency.

Miscellaneous Desserts

Nut Charlotte

½ cup 40% cream	8 pecan or walnut meats
2 tbs. sugar	¼tsp. vanilla or

1 tbs. sherry wine

Dissolve sugar in the cream and beat solid, add flavoring or sherry and nuts.

Orange Charlotte

½ cup of orange jelly mixture (see directions for making under jellies), ½ cup double cream, 1 tbs. sugar (the above quantity will require about 2 tsp. of granulated gelatin).

Pour jelly mixture into a bowl and surround with cracked ice; when it begins to stiffen, fold in the stiffly beaten cream.

Pour into molds or ice cream glasses and set aside in the ice-box to become set.

Snow Pudding

Orange, lemon, grape juice, or pineapple may be used in preparing this pudding.

½ cup fruit juice	¼ cup sugar
2 tsp. gelatin	1 egg white and
1 tbs. cold water	¼ cup soft custard

Make jelly mixture as already directed and place the bowl in a pan of cracked ice; when the mixture begins to stiffen, fold in the well beaten egg white (beat it in with an egg beater). Pour the mixture into a mold or individual glasses and set aside on ice to become set. When ready to serve, unmold and pour on the soft cold custard.

Prune or Prune Fig Whip

6 prunes or 4 prunes and 1 fig
1 egg white
2 tbs. sugar

Cook the prunes and figs in sufficient water to cover them until they are perfectly soft, press through a sieve, add sugar, chill thoroughly, and fold in the stiffly beaten egg white. The above mixture may be put in individual cups and baked in a slow oven (in a pan surrounded with hot water) until they are firm in the center and a light brown. Serve with or without whipped cream.

CHAPTER VI

INFANT FOODS AND THERAPEUTIC DIET RECIPES

Formulas Used in Feeding Infants

Whey

Put one pint of skimmed milk into a clean saucepan and heat to a temperature of 100° F. (lukewarm). To this milk add 2 teaspoonfuls of liquid rennet, essence of pepsin, or 2 junket tablets, stir until well mixed, and allow to stand at room temperature (70° F.) until firmly jellied. Break up with a fork until it is finely divided, strain through thicknesses of cheesecloth; return the fluid part to the stove and raise to a temperature of 150° F. to destroy the rennet left in the whey. The whey is then cooled before it is added to the milk or cream.

Barley Water

3% decoction starch [1]
4 rounded tsp. barley flour
1 pt. water

Mix a small amount of the water with the barley flour and put the rest of the water into a clean saucepan and allow to heat; when boiling add thin barley mixture, stir thoroughly, and allow to boil 20 minutes; remove from stove, measure, and replace with hot water that which was lost through evaporation to make up the original pint; strain through two thicknesses of cheesecloth.

[1] When a 1.50% decoction is desired, use 2 rounded teaspoonfuls to the pint of water. "Diseases of Nutrition and Infant Feeding," p. 222, by Morse and Talbot.

Oat Water

4 rounded tsp. oat flour
1 pt. water
Mix and proceed as in making barley water

Albumen Water with Brandy

8 oz. water (cold)
1 egg white
1 tsp. brandy

Mix egg and water and add brandy slowly to prevent coagulating egg white.

Beef Juice

Composition: 0.60% fat, 2.90% protein, and considerable extractive matter.[2]

Place a piece of round steak upon a hot griddle and turn once or twice until the outside is seared and the meat it hot throughout. Remove from griddle and cut into small pieces and place in a small meat press made for the purpose. A lemon squeezer may be used when the press is not available. Salt lightly. Begin by giving one teaspoonful and increase the amount gradually to 1 ounce (6 teaspoonfuls). According to Morse and Talbot, it is never wise to give babies more than 2 ounces of beef juice even in their second year, as it is apt to disturb digestion. Also babies are often made restless or sleepless by taking beef juice.

Malt Soup

1½-2 tbs. malt soup extract (reduce if necessary)
1 level tbs. sifted flour
1 pt. milk
18 oz. water (hot and cold)

[2] "Beef juice is not the same as 'dish gravy,' since the latter contains a large amount of cooked fat and is often highly indigestible." Morse and Talbot's "Diseases of Nutrition and Infant Feeding."

Dissolve malt soup extract in ½ cup of hot water and measure in enough cold water to cool the mixture. With the remaining cold water mix the flour until it is free from lumps; and to the malt soup mixture, add milk. Pour all into a clean saucepan and bring slowly to the boiling point; simmer (not boil) for 20 minutes. Now increase the heat and allow the mixture to boil 5 minutes; strain and use as directed.

This is a fattening mixture and the amount of malt soup and whole milk may be increased as the child is able to handle it, taking care, however, not to increase the strength of the mixture too rapidly or too much, or digestional disturbances will result.

Buttermilk Mixture for Infants

1 tbs. wheat flour, 4 lbs. dextri-maltose, 8 oz. hot water plus enough hot water to replace that which is lost through evaporation (about 6 oz.). Buttermilk, sufficient quantity to make 1 quart of mixture. Mix flour with a little cold buttermilk. Dissolve sugar (dextri-maltose) in the hot water

Stir two mixtures together and add enough buttermilk to make 1 quart. Place on stove and bring mixture quickly to a boil. Boil for 20 minutes, stirring constantly, strain, measure, and add enough boiling water to replace that which is lost in cooking. Place on ice and use as directed.

The nurse will soon be able to tell how much water is lost in evaporation and add the additional amount to the mixture before beginning the boiling.

Eiweissmilch[3]

(Protein or Albumen Milk)[4]

1 quart fresh whole milk
1 pint of fresh buttermilk
4 teaspoons essence of pepsin,

[3] Formula suggested by Finkelstein and Meyer.

[4] Protein milk powder now on market simplifies the making of Eiweissmilch. (Merrell-Soule Co., Mead and Johnson, Dryco Dr. Milk Co.)

Heat whole milk to 100° F., add essence of pepsin and stir thoroughly. Allow to stand at same temperature until the curd is formed. Pour mass into muslin bag and drip the whey from the curd. When the mass is as dry as it is possible to have it, remove it from the bag to a fine strainer. Press curd through the strainer with a wooden spoon or potato masher (the author has found that a potato ricer with a piece of copper gauze, such as is used in a chemical laboratory, inserted, facilitates the breaking up of the curd). The mass must be passed several times through the strainer in order to make the precipitate sufficiently fine to look like milk. During the process of straining, the buttermilk is added. The composition of above formula is, according to Finkelstein and Meyer, as follows:

Protein 3%, Fat 8.5%, Sugar 1.5%, Salts 0.5%.

There are several prepared Eiweissmilch mixtures on the market, Beebe, Hoose and others. Larasan Roche is also a prepared mixture having a composition much like that of the original Eiweissmilch, it is easily prepared, and the results from feeding this milk have been found generally good.

Nutrient Enemas[5]

No. 1 Milk and Egg

6 oz. milk, 1 egg
1 tsp. pure peptone (this may be omitted)
½ oz. normal saline solution
1 tube peptonizing powder dissolved in 1 tbs. water

Mix thoroughly and peptonize at a temperature of 110° F. for 1 hour.

No. 2

8 oz. milk   3 eggs   3 grains table salt

No. 3

8 oz. milk   2 oz. glucose (grape sugar)

[5] "Diet in Disease," by Freidenwald and Ruhrah and other sources.

No. 4. Singer's Enema

125 gm. (about 4 oz.) milk
1 or 2 egg yolks
125 gm. (about 4 oz.) wine
Salt
1 tsp. Witte's peptone

No. 5. Boas' Enema

250 c.c. (8 oz.) milk
2 egg yolks
Small quantity of salt
1 tbs. of red wine
1 tbs. "Kraftmehl" Health Flour

No. 6

6 oz. bouillon
4 oz. red wine
1 egg yolk
1 to 2 tsp. dry peptones

No. 7. Milk and Starch Enemas—Von Leube

250 c.c. (about 8 oz.) milk
70 grains starch

Malted Milk Enema

Dissolve 1 oz. of malted milk in 8 oz. of hot water
1 egg and ½ tsp. salt or ½ oz. saline solution

Normal Saline Solution

1 dram sodium chlorid (common salt)
1 pt. (16 oz.) water, (boiled)

Glucose Enema

10 gm. bicarbonate of soda
25 gm. glucose
500 c.c. (1 pt.) water

Formulas Used in Diet for Constipation

Prunes and Figs

½ lb. each prunes and dried figs
1 oz. senna leaves

Boil from 2 to 3 hours as directed in preparing prunes

as above. Lift fruit from hot sirup, place in quart jars, strain the juice and pour over the fruit. Use as needed.

Conserve

⅓ lb. prunes (pits removed)	⅓ lb. figs
⅓ lb. raisins (seeded)	1 oz. senna leaves

Boil prunes just enough to allow of the pits being removed. Cool and pass with the senna leaves, figs and raisins through the food chopper. After passing through once return to chopper and pass through a second time. See that the senna leaves and fruit are thoroughly mixed and finely chopped. Place in a quart jar and give in doses of from 1 to 2 teaspoonfuls night and morning.

Bran Gems (No. 1)

2 tbs. molasses	1½ cup bran
½ tsp. salt	½ tsp. soda
½ cup milk	1 egg

Mix soda into bran, add salt, stir milk and molasses together and stir into bran; add well-beaten egg. Bake in 6 well-greased gem pans.

Bran Gems (No. 2)

1½ cups bran	1 egg
1 tbs. sugar	1 cup milk
2 tbs. melted butter	2 tsp. baking powder

Mix together and bake in 6 well-greased gem pans.

Bran Biscuits

1 cup of bran	2 tbs. butter and lard mixed
½ cup of flour	1½ tsp. baking powder
½ tsp. salt	⅓ cup of milk

Mix flour, salt, baking powder and shortening together. Add milk to make a soft dough. Mold into biscuits, and bake in a quick oven 10 to 12 minutes.

Bran Cookies

½ cup of sugar
½ cup of molasses
¼ cup of butter and lard mixed
1½ cups of bran
1 cup of flour
1 tsp. cinnamon
1 tsp. ginger
½ tsp. cloves
½ tsp. nutmeg
2 eggs

½ cup raisins or nuts may be added, due allowance being made for the additional fuel value,

and

Cream butter and sugar together, add molasses. Sift flour, salt and spices together. Add eggs (well beaten), to sugar mixture and stir in the remainder of ingredients. Drop from spoon on a well-greased pan, bake in moderate oven to a delicate brown.

Formulas Used in Diabetes[6]

BREADS

* Bran Agar Wafers

Makes 30 wafers.

2½ quarts washed bran (*dry*)
36 gms. agar-agar
1½ tsp. salt
2 saccharin tablets (½ gr.)
600 c.c. of cold water

[6] Formulas marked with one star are those used in the Presbyterian Hospital, Chicago, Ill. Courtesy of Mrs. Rose Straka Fowler. Two stars, Mayo Clinic, Rochester, Minn. Courtesy of Misses Foley and Ellithorp. Additional formulas are the author's own and these obtained through the courtesy of Miss Ruth Bowden, Potter Metabolic Clinic, Santa Barbara Cottage Hospital, Calif., and Miss Florence Smith, St. Mary's Hospital, Rochester, Minn.

Mix agar-agar, saccharin, salt and water. Boil until dissolved. Pour over dry bran. Mix thoroughly and mold into muffin tins while hot. Bake in a slow oven about 20 minutes, or until wafer is dry and will whirl in the tin.

Cellu Bran Crackers

½ cupful cellu flour
1 cupful dry, washed bran
1 tablespoonful India gum
1 teaspoonful baking powder
½ teaspoonful salt
3 tablespoonfuls mineral oil
½ grain saccharin
Hot water

Makes 12 crackers about 4 inches by 4 inches and ⅛ inch thick (resembling Graham crackers).

Mix all dry ingredients. Add mineral oil and saccharin dissolved in a small amount of water. Then add sufficient hot water to make a soft dough. Spread on a baking sheet or in flat baking pans and cut into twelve wafers. Bake in a slow oven until dry.

These crackers have practically no food value.

** Olmsted Brancakes

3 cupfuls bran, washed
2 eggs
2 egg yolks
¼ teaspoonful salt
50 grams lard or crisco, melted
180 grams water
½ teaspoonful baking powder

Mix ingredients in order given and bake in a moderate oven. This recipe makes 18 muffins. Food value of 6 muffins, 1 gram carbohydrate, 5 grams protein, 23 grams fat.

** Soya Manna Muffins

2 eggs
60 grams cream—20%
140 grams Soya Manna
20 grams butter
½ teaspoonful baking powder
100 grams water

Beat eggs, add cream and then flour, beating all the time. Add water and melted butter. Mold into 12 cakes

and bake. Each cake contains 6 grams protein, 6 grams fat: approximately 75 calories.

Soya Manna may be secured from Vitae Health Food Company, 364 Roy Street, Seattle, Washington.

Bran Biscuits, or Muffins

1 cup washed bran	1 tbs. melted butter
1 tsp. baking powder	2 tbs. cream
1 egg	¼ tsp. salt

Tie bran in cheesecloth bag and attach to cold water faucet; allow water to pass through bran, removing starch by squeezing the water through; using dry. Beat egg separately; add cream; mix with bran, add melted butter, salt, and baking powder. Grease muffin rings and pour in the mixture. Bake in moderate oven.

Hepco Cake[7]

Recipe for Hepco Cakes, so arranged that one cake is equivalent to an egg:

140 gm. Hepco flour	Protein 60	Fat 29
2 eggs	Protein 12	Fat 12
60 c.c. 40% cream	Protein 2	Fat 24
10 gm. butter		Fat 9

Make twelve cakes; each cake contains 6 grams of protein, 6 grams of fat, and approximately 75 calories.

Bran Biscuits for Constipation
(By F. M. Allen)

60 gm. bran	6 gm. powdered agar-agar
¼ tsp. salt	100 c.c. (½ glass) cold water

Tie bran in cheesecloth and wash under tap until water is clear. Bring agar-agar and water (100 c.c.) to boiling point. Add washed bran and salt and agar-agar solution

[7] "The Treatment of Diabetes Mellitus," p. 531, by Joslin.

(hot). Mold into ten cakes; place on oiled paper and let stand ½ hour, then when firm and cool, bake in moderate oven 30 to 40 minutes. The bran muffins are more palatable if butter and eggs are added. This may be done, provided the patient allows for them in the diet.

Casoid Flour and Bran Muffins

1 oz. (30 gm.) casoid flour
1 level tbs. (15 gm.) butter
1 oz. (30 c.c.) 40% cream
¼ tsp. salt
1 egg white (whole egg may be substituted for 1 egg white)
1½ tsp. baking powder
1 cup washed bran

Total food value: protein, 18 grams; fat, 24 grams; carbohydrates, 1 gram; calories, 300 grams.

One muffin: protein, 3 grams; fat, 4 grams; carbohydrates and calories, 50.

The flours and meals used in these recipes are prepared by Cutlard, Stewart & Walt, Ltd., London (casoid flour). Theo. Metcalf & Co., Boston (soya bean meal). Lister Brothers, Andover, Moss. (Lister diabetic flour).

Soya Meal and Bran Muffins [8]

1 oz. (30 gm.) soya meal
1 level tbs. (15 gm.) butter
1 oz. (30 c.c.) 40% cream
¼ tsp. salt
1 cup washed bran
1 egg white (one whole egg may be substituted for 1 egg white)
1½ tsp. baking powder

Mix soya meal, salt, and baking powder. Add to washed bran; add melted butter and cream. Beat egg white and fold into mixture; add enough water to make thick drop batter. Bake in six well-greased muffin tins until golden brown from 15 to 25 minutes.

Total food value: protein, 11 grams; fat, 27 grams; carbohydrates, 2 grams; calories, 304; one muffin, 2 grams; fat, 4.5 grams; carbohydrates, trace; calories, 50.

[8] "Starvation Treatment of Diabetes," p. 43, by Hill and Eckman.

Almond Biscuits

1 cup almond meal
1 oz. cream
1 egg
1 grain (or less saccharin, dissolved in 1 tsp. of water
1½ tsp. baking powder
3-4 drops vanilla

Beat egg yolk until light, add cream and saccharin; stir this into almond meal. Fold in the stiffly beaten white. Drop on a greased paper and bake until golden brown in a moderate oven.

Almond meal or flour is prepared as follows:

Blanch 1 pound of almonds; dry and pass through grinder, or pound in mortar until powdered. Place in a muslin bag and immerse in a pan of water acidulated with vinegar to remove sugar; allow to stand 15 minutes. Squeeze dry and place in a warm (not hot) oven to remove all moisture. Grind or pound once more. Almond flour does not keep well; it must be made in small quantities and kept in a glass jar in a cool place.

Cocoanut Flour

Grate cocoanut and treat as almonds to remove sugar; dry thoroughly and grind or pound to fine meal.

Cocoanut Biscuits

1 cup cocoanut
1 egg white (or whole egg if desired)
1½ tsp. baking powder
½ grain saccharin

(A biscuit may be made without saccharin for bread substitute.)

Brancakes

Value of 6 cakes (muffins), 1 gm. carbohydrate, 5 gms. protein, 23 gms. fat (1 muffin, trace of carbohydrate, 0.8 gm. protein, 6 gms. fat).

3 cups washed bran
2 eggs plus 2 yolks
180 c.c. water
50 grams shortening (lard, butter or other shortening), melted
¼ tsp. salt; ½ tsp. baking powder

Mix ingredients in order given, mold in hot greased muffin tins, bake in slow oven until fairly dry (muffins are more palatable if not cooked too dry).

Bran Gems (No carbohydrate)

The value of recipe, prot. 9 gms., fat 18.5 gms., coh. 0

1 cup Curdolac bran	1 tbs. melted butter	1 egg yolk
½ tsp. salt	1 cup water	2 egg whites

Beat egg yolk thoroughly, add bran, butter, salt and water. Fold in the stiffly beaten whites of eggs, shape into 18 gems and bake in moderate oven until crisp (add the water cautiously, enough only to make thick batter, spice or sugar-free flavoring may be added if desired).

Nutrivoid Bran Wafers

No Food Value

1 cup washed bran	1 tbs. India or pastry gum
½ cup nutrivoid flour	3 tbs. mineral oil
½ tsp. salt	Hot water to make soft dough

Mix dry ingredients, add oil, then hot water. Spread on baking sheet about 1/6 of an inch thick. Cut into small squares, and bake in a slow oven until dry.

Lister-Bran Muffins

12 muffins each having a food value value of 3 gms. prot. and 4 gms. of fat; no coh.

40 gms. Lister flour (⅔ of a box)	30 gms. (2 T.) butter
1 egg	½ cup dry washed bran
	45 c.c. (3 T.) XX (40%) cream
	¼ tsp. salt

Mix dry ingredients together, melt butter and add to cream, beat yolk of egg and add to cream mixture. Combine with dry ingredients. Beat egg white stiff and fold into mixture. Bake in well greased muffin tins.

Lister Muffins

Food value: Prot. 50 gms., fat 48 gms., coh. 1 gm.
(12 muffins)

Lister flour, 60 gms.
40% cream, 45 gms.
1 egg
Butter, 30 gms.

Mix and bake in 12 small greased muffin tins.
Value of each muffin 4 grams protein and 4 grams of fat.

Diaban Muffins

12 muffins each having a value of 5 gms. coh., 5 gms. prot., 3 gms. fat.

1 can Diaban flour
¾ cup milk (180 c.c.)
1 egg

Beat white and yolk separately. Add yolk and milk to flour. Fold in stiffly beaten white. Bake in greased muffin tins.

Pancakes

Each pancake has a food value of ⅔ gm. coh., 2 gms. fat, 2 gms. prot. Made from Cudolac Johnny Cake flour

1 egg
2 tsp. cream (sour)
3 T. water
3 T. Johnny Cake Flour
Pinch soda

Beat egg well and add cream and a pinch of soda. Add flour and beat well. Grease griddle with oil or bacon fat. Bake in 6 pancakes. Serve with diabetic maple syrup.

Rolled Oats Muffins

	Amount	Protein	Fat	Carbo-hydrate
Dry rolled oats	50 gms.	8.	4.	33.
Eggs	1 whole	6.5	6.	0
Fat-oil	40 gms.	0	40.	0
Washed bran	3 cups	0	0	0
Water	1 cup	0	0	0
Salt	1 tsp.	0	0	0
Baking powder	1 tsp.	0	0	0
	12 muffins	14.5	50.	33.
	1 muffin	1.	4.	3.
	100 gms.	10.	31.	24.

First Method.—Mix the dry ingredients, add water gradually, eggs well beaten, add melted fat, bake in a hot oven in greased gem pans 25 minutes.

Second Method.—Cook rolled oats, fat, water and salt together until oats are soft. Cool, add yolks of eggs and stir thoroughly. Lastly, add stiffly beaten whites and bake in hot oven.

Popovers

	Coh. gms.	Prot. gms.	Fat gms.
Flour, 42 gms.	32	3	0
Eggs, 4 gms.	0	24	24
Cream (40%) 120 gms.	4	2	48
Salt, ¼ teaspoonful	0	0	0
Food value of twelve popovers	36	29	72
Food value of one popover	3	2	6

Beat the eggs thoroughly; add gradually, while beating, the flour with which the salt has been sifted. Add the cream slowly and beat until thoroughly mixed. Pour the mixture into hot buttered muffin tins. This recipe makes twelve popovers. Bake in very hot oven for five to eight

minutes, then reduce the oven temperature and continue the baking until the popovers are dry and crisp.

Washed Bran (no fuel value)

The bran may be purchased at any food store.

1 cup of bran · · · · 8 cups of water

If a sufficiently large utensil is available, prepare several cups of bran at a time. Place in large boiler and boil for 15 minutes; pour into sieve and allow cold water to pass through bran for several minutes; repeat this process twice more; then squeeze the bran dry and spread in a shallow pan; place in the oven (warm, but not hot), and dry thoroughly. The bran thus prepared may be used as it is, or run through a grist mill. In cases of diabetes with constipation, it is advisable not to grind the bran fine. This bran is used for making the muffins and cakes called for in the diabetic dietaries.

SOUPS AND VEGETABLES

Vegetable Soup (1)

Value, 1 cup: Coh. 4 gms., prot. 5 gms., fat 4 gms.

2 cups of broth, or
2 cups of water
½ lb. lean beef
½ cup celery
½ c. chopped carrots
½ c. canned tomatoes
½ cup cabbage

Salt and pepper to season

Cook vegetables in broth (fat-free) or with water and meat, until very tender, skim off the fat, season and serve.

Vegetable Soup (2)

Use 2 cups fat free broth
10 gm. 10% vegetables (onion, carrot)
50 gm. 5% vegetables
Salt and pepper to taste

The vegetables may be taken from the day's allowance. Cook vegetables in clear broth until tender, season, and serve.

To vary, use 60 gm. tomato purée (sifted tomatoes); 1 teaspoonful of India gum to thicken slightly.

Beet Soup Borsch (Jewish)

Value, 1 serving: 1 cup 240 gms., coh. 5 gms., prot. 6 gms., fat 5 gms.

4 medium sized beets, 220 gms. 2 eggs
Sour cream, 3 T. (45 c.c.) Vinegar 1 T.
Water sufficient to make 1000 c.c. or about 4 cups

Cook beets until tender. Remove skin and press through coarse strainer or sieve. Add 1 quart of water. Boil until thick, add salt, stir in the sour cream and vinegar. A few moments before serving add the well beaten eggs. The above rule will furnish 4 servings.

Spinach Soup

Value of 1 serving (240 gms.) or 1 cup. Coh. 4 gms., prot. 6 gms., fat 5 gms.

2 cups cooked spinach 3 T. sour cream
2 eggs 1 T. vinegar
Salt and pepper to season.
Water sufficient to make 5 cups (full).

Make as directed for beet soup.

Cream Soups

Cream of Celery

Value: Coh. 10 gms., prot. 6 gms., fat 38 gms.

Celery ½ cup Cream X ¾ cup
Pastry or India gum ½ tsp. Salt and pepper to flavor

Cook celery until very tender. Press through sieve. Allow water sufficient to make ½ cup. Add cream. Place in double boiler; stir in pastry gum beaten with egg beater until smooth, while cooking. Season with salt and pepper.

Cream of Spinach (No. 1)

Value, 1 cup: Coh. 2 gms., prot. 6 gms., fat 38 gms.

1 cup spinach purée	¾ cup X cream
½ tsp. pastry gum	Salt and pepper to season

Heat cream in double boiler. Stir in pastry gum, beat until smooth and of the consistency of cream. Add spinach. Season and serve. If too thick add hot water.

** Noodle Soup

½ pint broth—clear	5 grams butter
1 egg noodle	Few grains salt and pepper

Beat eggs until stiff and bake in 5 grams of butter as an omelet; let cool, cut into strips as noodles. Heat broth and add noodles. If desired, add vegetables, cut in cubes, using such variety and quantity as give flavor to soup adding their food value to diet. Food value 6 grams protein, 10 grams fat.

Cream of Cauliflower

¼ cup cauliflower purée	¼ tsp. onion juice (if desired)
⅔ cup chicken or beef stock	2 tbs. 40% cream
	Salt and pepper

Add cauliflower to stock, and allow to come to a boil, season and add cream. Serve at once.

Tomato Bisque

1 cup creamed tomatoes	3 cloves
½ cup water	½ tsp. salt
1 sprig (1 tbs. chopped) parsley	⅛ tsp. soda

1½ oz. (3 tbs.) 40% cream

Cook tomatoes with cloves, parsley, and water for 20 minutes. Press through sieve and return to fire. Add soda; when effervescence ceases, add cream, and serve at once.

Spinach Soup

30 gm. cooked spinach	15 c.c. 40% cream

1 egg yolk

Cook spinach until tender and press through a sieve; add the broth; allow to cook about 5 minutes and add the well-beaten yolk and cream. Place the saucepan over hot water and cook 10 minutes. Season and serve at once.

Other Cream Soups, except Tomato Bisque, are made by the same recipe.

White Sauce for Vegetables or Soup

Value: Coh. 4 gms., prot. 2 gms., fat 17 gms.

Cream 20% (X) ⅓ cup	Pastry or India Gum ¼tsp.

Salt and white pepper to season

Heat cream over hot water. Stir in gum beating continuously until smooth. Remove from fire and add salt and pepper.

Cheese Sauce for Vegetables

Add 2 Gms. Prot. and 3 Gms. Fat to white sauce rule. Add 10 gms. grated cheese to white sauce. Heat sauce, stir in the grated cheese. Serve on cauliflower, asparagus, or stewed celery or any other vegetable where cream sauce is used.

Vegetables

The nurse must be governed in the selection of the vegetables by the physician, using those from the 5% group until otherwise ordered. These must be boiled in three separate waters to further reduce their carbohydrate content.

Cream or butter is added to them when diet permits; in the beginning (after starvation) only salt or (in case the vegetable is given in form of a salad) a little lemon juice with a little salt and pepper added.

Grated onion, a small quantity of celery seed, or a tiny bit of chopped green pepper may be added for additional seasoning. When some fats are allowed, butter, olive oil, and cocoanut cream may be used; the latter is prepared as follows:

1 small cocoanut grated; this is washed in cold water slightly acidulated with vinegar to remove the sugar, then washed to remove the vinegar. Over the washed cocoanut pour one pint of boiling water; allow to stand until cold enough to squeeze through a cloth; press as much of the water out as possible. Pour the water into a shallow dish and allow to stand until the cream rises; skin off and serve with lemon juice on salad as a dressing.

Thrice Cooked Vegetables

In order that enough vegetables may be eaten to satisfy a large appetite it is necessary to deprive the vegetables in group 1 and 2 of their carbohydrate content, this can only be done by cooking them through three waters. Carbohydrates in this group (1-2) dissolve out in the cooking water, so may be eaten without danger of increasing the sugar content of blood or urine. They are prepared as follows:

Prepare vegetables as for ordinary cooking, covering with boiling water. Allow to boil five (5) minutes, pour off this water and cover with fresh water, repeat the process. After covering with water the third time, finish the cooking, adding salt as desired. Or, in the case of cooking greens, beans (green or string beans), cabbage, etc., where it is desirable to cook with salt meat, wait until the third cooking before adding meat, then finish the cooking as for ordinary preparation of vegetables. When salt meat is cooked with

vegetables, it must be weighed and allowed for in the fat quota for the day. When vegetables are to be thrice cooked but not flavored with salt pork it is possible to increase their palatability by cooking one-third of the allowance through one water only, and adding it to the thrice cooked vegetable. When this is done an allowance must be made for the additional carbohydrate, but the dish will be more pleasing to the taste.

Boiled Corned Beef with Cabbage and Other Vegetables [9]

"A portion containing 50-75 grams meat and 100 grams of each vegetable makes an excellent meal."

Horseradish (sauce) is recommended by Joslin as a seasoning, and some pickles made from group of 5% vegetables and without sweetening.

Curry powder, tarragon, bay leaves, capers may likewise be used in moderation to vary the monotony of the diet.

** Cabbage Soufflé

100 grams cabbage, cooked
15 grams lean meat, cooked, minced
35 grams sour cream—16%
1 egg
10 grams American cheese
Few grains salt and pepper

Chop cabbage fine, add meat, cream, beaten egg, salt and pepper. Put into mould and sprinkle grated cheese over top. Bake in a moderate oven until firm and brown. Food value, 5 grams carbohydrate, 15 grams protein, 17 grams fat.

** Celery Ramekins

50 grams milk
½ hepco cake
25 grams celery
1 egg
5 grams butter
Few grains salt and pepper

[9] "Treatment of Diabetes," p. 538, by Joslin.

Heat milk; add crumbed hepco cake, grated celery and seasonings, let come to a boil, add butter, remove from fire; add beaten egg yolk. Fold into beaten white. Put in ramekin and bake 20 or 30 minutes in slow oven until well browned. Food value, 3 grams carbohydrate, 11 grams protein, 15 grams fat.

** Baked Onion

50 grams onion, uncooked
10 grams ground meat, lean cooked
Few grains salt and pepper
15 grams whole milk

Parboil the onion, scrape out the inside, leaving only shell. Weigh shell and scrapings to 50 grams. Add meat and return to shell. Put into casserole, add milk and bake until tender. Food value, 4 grams carbohydrate, 4 grams protein, 2 grams fat.

Turnips with Cheese

1 medium sized turnip
½ tablespoon butter
1 tablespoon grated Am. cheese
Salt and pepper to season

Boil turnip until almost tender, then with spoon remove the center, leaving a thin outer layer. To the remainder of the turnip which has been mashed, add the grated cheese and butter, salt and pepper, fill turnip shell, place in oven and bake ten minutes.

The same rule may be used with tomato (fresh), selecting one that is not fully ripe. Egg plant may likewise be used in this way. Select a small egg plant. When ready to add cheese, split in half lengthwise. 1 tsp. pastry gum may be added to either the tomato or egg plant for thickening purposes. This is added with the cheese. If it is desired, 1 tablespoon of crumbs from a bran muffin may be sprinkled

on top and 1 teaspoonful of butter placed above it before returning to oven to bake.

Value of turnip and cheese: Coh. 7 gms., prot. 3 gms., fat 9 gms.

Value of tomato and cheese: Coh. 5 gms., prot. 3 gms., fat 9 gms.

Value of egg plant and cheese: Coh. 3 gms., prot. 3 gms., fat 9 gms.

SALADS

Neufchâtel Cheese Salad

⅓ Neufchâtel cheese	1 tbs. cream (40%)
¼ green pepper	1 tsp. lemon juice

Season with salt and paprika and dress with cream dressing.

Cheese Salad

Mash cream cheese with fork; add tablespoonful chopped pecan nuts to ⅓ Neufchâtel cheese. Season with salt and pepper and dress with French dressing.

Tuna Fish Salad

½ cup tuna fish	½ cup chopped celery

Dress with French Dressing

Egg Salad

Cook 1 egg hard. Cut into rings; arrange on lettuce leaf; dress with cream dressing.

Clover Leaf Salad

Household Measure	*Metric System*
2 leaves lettuce	30 grams
1 green pepper	100 grams
3 tablespoons cottage cheese	45 grams
2 tablespoons English walnuts	30 grams

Stuff well washed pepper with cottage cheese, mixed with walnut meats. Chill one hour and cut in thin slices, serving 3 or 4 on the lettuce leaf. Food value, protein 16, fat 22, carbohydrate 5 gms.

Carrot Salad

Household Measure	*Metric System*
¼ cup carrots (raw grated)	50 grams
1 tablespoon almonds, chopped	15 grams
2 leaves lettuce	30 grams
4 teaspoons mayonnaise	20 grams

Mix carrots and almonds, arrange on lettuce leaves and serve with 20 grams mayonnaise. Food value, 1 serving, protein 4, fat 26, carbohydrate 8 gms.

Perfection or Gelatin Salad

Household Measure	*Metric System*
1 teaspoon gelatin	5 grams
1 teaspoon vinegar	5 grams
⅛ cup boiling water	25 grams
1 tablespoon cabbage	15 grams
1 tablespoon pineapple (fresh)	15 grams
1 teaspoon green pepper	5 grams
1 tablespoon mayonnaise	15 grams
1 leaf lettuce	15 grams

Soften gelatin with cold vinegar. Add boiling water. Cool and add other ingredients, all chopped finely. Turn into molds and when stiff serve on lettuce leaf with mayonnaise dressing. Food value, 1 serving, protein 5.0, fat 13.5, carbohydrate 4.0 gms.

Tomato Aspic

Value: Whole recipe (with mayonnaise), Coh. 16 gms., prot. 3 gms., fat 30 gms.; one serving, coh. 8 gms., prot. 2 gms., fat 15 gms.

1 cup canned tomatoes
2 large and 4 small stalks celery
½ small onion
6 medium leaves of lettuce
3 tsp. agar flakes or 3 tsp. gelatin (if gelatin is used add 6 gms. to protein value).
½ cup water
¼ cup milk vinegar
4 or 5 cloves
2 T. mayonnaise
1 sprig parsley
½ tsp. salt
Dash of pepper

Place tomatoes, water, onion and 2 large stalks of celery cut into pieces, cloves, parsley, in a saucepan and cook 15 minutes. Strain, return to fire with vinegar and agar. Allow to boil until agar is dissolved. While mixture is cooking, line a small shallow pan or mold with remainder of celery cut into small pieces. When agar is dissolved, allow mixture to cool slightly, then pour over the chopped celery. Set aside to stiffen. To serve, divide the above jelly in two portions. Cut into blocks and place on 3 lettuce leaves with mayonnaise on top. To change the above rule add: 1 slice of breast of chicken cut into small pieces, prot. 13 gms., fat 1 gm.; or, 7 walnuts broken into pieces, coh. 5 gms., prot. 6 gms., fat 15 gms. Those additions may supplement the celery or be used in place of it.

Cream Cheese Salad

Value: Coh. 8 gms., prot. 8 gms., fat 27 gms.

½ medium sized green pepper
1 T. mayonnaise
3 walnuts or 2 olives chopped (value 7-5-24)
½ roll Neufchâtel (cream) cheese
3 leaves of lettuce

Mix one-half of the mayonnaise with the cream cheese, until smooth. Stir in the nuts or olives chopped fine (if mayonnaise is not sufficiently seasoned to furnish enough salt and pepper to season cheese, add salt and red pepper to season. Now, remove the seeds from green pepper, cut in half (cross-wise), fill the cavity with cheese mixture,

pressing it into all of the spaces firmly. Place on ice to stiffen. When ready to serve, cut in three slices with a sharp knife, arrange in shape of clover leaf on lettuce leaves. Place remainder of mayonnaise on top.

Celery and Grapefruit

Value: Coh. 8 gms., prot. 1 gm., fat. 15 gms.

3 large sections of grapefruit	4 small stalks celery
3 medium lettuce leaves	1 T. mayonnaise

Remove all membranes from grapefruit and break into small pieces. Cut celery into small pieces and mix with grapefruit. Stir into salad one half of the mayonnaise, taking care not to bruise the fruit. Place on lettuce leaves with remainder of mayonnaise on top.

Egg Salad

Value: Coh. 3 gms., prot. 10 gms., fat 20 gms.

1 egg	2 stalks celery
3 leaves lettuce	1 T. mayonnaise

Hard cook the egg and cut into small pieces, taking care not to bruise the yolk. Cut celery into pieces and add to the chopped egg. Stir the mayonnaise into the salad mixture with fork. Place on lettuce leaves.

* Spinach and Egg Salad

3 gms. gelatin	2 tbs. cold water, melt and swell over hot water.

Add:

6 tbs. cold water	50 gms. fresh cooked spinach
2 tbs. vinegar	1 hard cooked egg

Salt as desired

Surround mold with slices of hard cooked egg, placing

the spinach in the center. Pour over this the gelatin mixture; allow to mold and serve on lettuce.

SALAD DRESSINGS

Mayonnaise

Value of recipe: Coh. 2 gms., prot. 3 gms., fat 95 gms.
Value of 1 T.: 15 gms. fat.

1 egg yolk
1 cup olive or other salad oil
⅛ tsp. red pepper
2 T. lemon juice
¼ tsp. dry mustard
½ tsp. salt

Mix salt, pepper and mustard into egg yolk, beat in the lemon juice (or same amount of vinegar). Begin to add oil 1 teaspoon at a time, beating well between each addition, until mixture begins to thicken. The oil may now be added in larger quantities, taking care to beat in each spoonful thoroughly before adding the next. When the oil is all in, the mixture should be a soft solid, free from oily deposit. Place on ice or in cool place.

Mineral Oil Mayonnaise

½ tsp. salt
1 egg yolk
1 cup heavy mineral oil
2 T. lemon juice or vinegar
½ tsp. dry mustard
¼ tsp. red pepper

Mineral oil is tasteless, hence must be more highly seasoned than olive or other salad oils. Mix as directed for regular mayonnaise, taking care that the egg is fresh and the oil cold.

French dressing may be substituted for mayonnaise if desired. Or, in cases where it is desirable to limit the fats, substitute mineral oil mayonnaise for the olive oil dressing and deduct the value of latter from fat allowance.

Thousand Island Dressing

Value of 1 T.: Coh. 1 gm., prot. 0, fat 19 gms.

1 T. mayonnaise
1 tsp. chili sauce
1 tsp. chopped olive
1 tsp. chopped green pepper
1 tsp. chopped sour pickle

Chop olives, pepper and pickle fine; add to mayonnaise.

EGGS—MEAT—FISH

Eggs

Egg Omelet

Value: Coh. 0, prot. 7 gms., fat 14 gms.

1 egg
1/6 tsp. salt
1 T. water
1 sq. butter (2 tsp., 10 gms.)
Few grains pepper

Beat white and yolk separately, add water to yolk, season. Beat white very stiff and fold into yolk. Divide butter, place one half the amount in small fry pan, heat, and pour in the egg mixture. Stand on top of stove one or two minutes, then place in a slow oven to become a delicate brown. Melt butter and pour over omelet, fold omelet when placing on plate.

Cheese Omelet

Value: Coh. 0, prot. 11 gms., fat. 19 gms.

1 egg
1 sq. butter
1 T. water
2 T. Am. cheese (grated)
Salt and pepper to season

Beat egg yolk, add cold water; stir in grated cheese. Beat egg white very stiff, fold into mixture. Use one-half the butter to grease the hot fry pan, pour in the mixture. Stand on top of stove 1 to 2 minutes. Place in oven to finish baking. When omelet is firm in center and of a delicate brown remove from oven; with a knife crease the center, turn onto a plate one-half folded over the other.

Tomato Omelet

Value: Coh. 3 gms., prot. 8 gms., fat 14 gms.

1 egg	1 cup canned tomatoes
1 sq. butter	Salt and pepper to season

Beat yolk with 1 T. tomato juice, season. Beat white very stiff and fold into the yolk mixture. Place in greased fry pan as directed above. Cook 1 to 2 minutes on top of stove. Finish the baking in oven. While omelet is baking, place the remainder of tomatoes in saucepan with remainder of butter, salt, pepper and a few drops of onion juice if desired. When omelet is ready to serve place on hot plate and pour over it the hot tomato sauce.

A sweet fruit omelet may be used as a dessert, substituting (canned sugar free pineapple), fresh strawberries, for the tomato, leaving out salt and pepper and using saccharin to sweeten.

Golden Rod Eggs

Household Measure	*Metric System*
1 egg, hard boiled	50 grams
1 slice toast	20 grams
1/6 cup white sauce	30 grams
Pepper, paprika, parsley.	

Mince egg white finely with a fork, force yolk through a fine sieve, add white to sauce, and pour over toast. Pile yolk lightly over toast. Garnish with parsley. Food value 1 serving, protein 10, fat 12, carbohydrate 15 gms.

** Chicken Supreme

50 grams chicken weighed cooked	50 grams milk
	25 grams celery
½ egg	Few grains salt and pepper

Beat egg slightly, add chicken, cut in small pieces, milk, salt and pepper. Put in mold, set in pan of hot water and

bake in moderate oven until firm. Food value 4 grams carbohydrate, 18 grams protein, 13 grams fat.

** Salisbury Steak

75 grams steak—fat, weighed uncooked	25 grams onions, uncooked
	Few grains salt and pepper

Grind the meat, add seasoning and make into firm balls. Sear in hot mineral oil, then cook at a lower temperature. Food value, 2 grams carbohydrate, 17 grams protein, 22 grams fat.

** Veal Bird

75 grams meat	25 grams chopped celery
2 Olmsted brancakes, crumbed	Few grains salt and pepper

100 grams skim milk

Have meat cut in one thin slice. Use the trimmings chopped fine in dressing of crumbs, celery and seasoning moistened with water. Spread dressing on meat, roll and tie or skewer with toothpicks. Put in casserole and bake in milk until done. Food value, 6 grams carbohydrate, 23 grams protein, 19 grams fat.

** Salmon Molded

100 grams salmon	2 tablespoonfuls vinegar
1 egg yolk	Few grains salt
5 grams butter	½ teaspoonful gelatin
50 grams skim milk	1 tablespoonful cold water

Remove the salmon from the can, weigh, separate in flakes. Add beaten yolks, melted butter, milk and vinegar and salt. Cook over boiling water, stirring constantly until mixture thickens. Soak gelatin, strain and add to salmon. Fill individual molds, chill, and serve with cucumber sauce. Food value, 3 grams carbohydrate, 26 grams protein, 23 grams fat.

Sauces for Meats

Parsley Butter

5 gm. butter — 1 tsp. chopped parsley

Salt, pepper, and ½ tsp. lemon juice, if desired

Cream butter, add lemon juice, salt, and pepper. Stir in parsley. Serve on meat or fish.

Mint Sauce with Lamb

Household Measure	*Metric System*
¼ cup finely chopped mint leaves	50 grams
½ cup vinegar	100 grams
1 tablespoon powdered sugar	15 grams

Add sugar to vinegar. When dissolved, pour over mint leaves. Let stand 30 minutes over very low heat. Use as accompaniment for lamb. Food value, carbohydrate 15 gms.

For steak, use lemon juice, mushrooms, fried onions or parsley.

For fish, the mayonnaise dressing may be used with the addition of chopped onion, green pepper and parsley.

Hollandaise Sauce for Fish (2 servings)

Household Measure	*Metric System*
½ cup butter	100 grams
1½ teaspoons vinegar	7 grams
2 egg yolks	40 grams
⅓ cup boiling water	66 grams
Pepper	

Place egg yolks in double boiler, stirring constantly until slightly warm. Add butter slowly. When butter has been added, stir in seasonings and boiling water. Cook 1 minute, stirring all the time. Food value, 1 serving, protein 3, fat 50 gms.

Fish may also be rolled in bread crumbs and fried in deep fat; they may also be sautéed, broiled, scalloped or baked.

DESSERTS

** Squash Pie

1 egg
150 grams squash cooked
50 grams cream—16%
½ teaspoonful cinnamon
¼ teaspoonful nutmeg
Few grains salt
½ grain saccharin

Beat egg, add mashed squash, cream, spice, salt and saccharin dissolved in 1 teaspoonful of cold water. Bake until firm in center, using cellu-flour recipe for pie crust. Food value, 12 grams carbohydrate, 10 grams protein, 14 grams fat.

** Spice Cookies

2 eggs
½ grain saccharin
10 grams cream—16%
1 teaspoonful spices—cinnamon, cloves, nutmeg
20 grams ground almonds

Beat the yolks, add saccharin dissolved in cream, then spices and ground almonds. Add to the stiffly beaten whites. Drop from spoon on oiled pan and bake in hot oven. Food value, 4 grams carbohydrate, 16 grams protein, 25 grams fat.

Custard

Value: Coh. 8 gms., prot. 12 gms., fat 42 gms.

¾ cup cream, 20% (X)
1 whole egg
Saccharin 2 to 4 (½ gr.) tablets
¼ tsp. vanilla or other flavoring (sugar-free)

Heat cream in double boiler. When cream reaches scalding point stir in beaten egg and stir until mixture forms a coating on spoon. Have saccharin dissolved in 1 T. cold water and stir into custard. Add flavoring when custard is cold.

This rule may be used for ice cream. Pour into a small

freezer, or into a baking powder tin, surround with ice and salt. In using the baking powder tin, simply bury the tin in ice and salt, taking care to seal the edge with a strip of greased muslin to keep out the salt. Stand 3 hours.

Custard for Low-Calorie Diets (1 serving)

Household Measure	*Metric System*
1 egg	50 grams
¼ cup water	50 grams
Vanilla, saccharin	

Beat egg and water together. Add vanilla and saccharin. Pour into buttered custard cup and bake in slow oven until firm. Food value, protein 7.0, fat 5.5, carbohydrate 0.

Lister Cream Puff

This is made by pouring 30 grams of soft custard (diabetic) over 1 Lister biscuit.

Irish Moss Pudding

Carefully pick over and wash through several waters 1 tbs. Irish moss. Place in double boiler with ⅓ cup of water and 3 tbs. 40% cream and ¼ grain saccharin. Cook until mixture thickens when dropped upon a cold saucer. Pour over 1 stiffly beaten egg white; add 3-4 drops of vanilla extract. Mold and set on ice.

Irish moss may be used as a substitute for gelatin. The carbohydrates in this substance are not believed to be utilized for the manufacture of glucose in the human body.

Gelatin Jelly

Gelatin furnishes a certain amount of protein in easily digested form. It must be used, however, with the advice of a physician, and its protein content allowed for in estimating the day's allowance of that foodstuff. When fruit

jellies are made, either with gelatin or agar-agar, they must be sweetened with saccharin only, and flavored with sugar-free fruit extracts.

A simple and easily prepared gelatin dessert is put up under the name of D-Zerta. It is practically free from fuel value, and will add variety to the diabetic diet.

Method for Fruit Jellies

Soak gelatin in cold water about 2 or 3 minutes, then pour over it the boiling liquid; add saccharin and fruit juice, strain through cloth into wet molds. Set in cold place to stiffen; when firm, unmold. Serve with whipped cream, or pour liquid into baskets made from orange or grapefruit, hollowed out and the edges scalloped, or pour into shallow pans, and cut in ½-inch blocks when firm and serve on a bed of whipped cream.

Lemon Jelly

16.6 calories

½ cup boiling water
¼ to ½ saccharin tablet dissolved in 1 tbs. water
1 tbs. cold water
½ lemon or 2 tbs. (juice and ½ rind sliced thin)
2 tsp. granulated gelatin

Orange Jelly

54 calories

¼ cup boiling water
½ tbs. lemon juice
½ cup orange juice
1 tbs. cold water
¼ to ½ saccharin tablet dissolved in 1 tbs. water
2 drops orange extract
2 tsp. granulated gelatin

Spanish Cream

5 tbs. coffee, or
Infusion of cocoa nibs
1 tsp. gelatin
1 tbs. cold water
30 c.c. (1 oz.) 40% cream
1 egg
Saccharin to sweeten

Pour coffee, or cocoa infusion, into a double boiler, beat

egg yolk and saccharin dissolved in 1 tsp. of water, and stir into hot coffee. Cook gently until mixture coats the spoon (raw flavor of egg has disappeared); add gelatin and mix thoroughly. Whip cream and egg white. Place on ice to set.

Snow Pudding

Make ½ cup gelatin, as in lemon or orange jelly.

Whip in 1 egg white.

When gelatin is half congealed, mold and set on ice.

When ready to serve, unmold and serve with custard, or 1 tbs. whipped cream.

Nut Charlotte

60 c.c. (2 oz.) 40% cream	Saccharin to sweeten
30 gm. chopped walnuts	3-4 drops vanilla

Whip cream stiff; add saccharin, nuts, and vanilla.

1 tbs. sherry wine and 1 tsp. gelatin soaked in 1 tbs. cold water and melted over hot water may be substituted for vanilla to vary the above recipe.

Orange Charlotte

75 c.c. (5 tbs.) orange juice	1 tsp. gelatin
45 c.c. (3 tbs.) 40% cream	1 tbs. cold water
½ egg white	Saccharin to sweeten

Soak gelatin in cold water; dissolve over hot water, add to orange juice; add saccharin; set aside until it begins to jelly. Whip cream and add to partially jellied orange juice; fold in the stiffly beaten egg white; mold. Serve 30 grams.

Bavarian Cream

Value: Coh. 8 gms., prot. 6 gms., fat 34 gms.

⅔ cup X (20%) cream
1½ tsp. gelatin (soaked in 1 T. cold water for 5 minutes)
2½ gr. saccharin tablets
2 T. boiling water
Vanilla or other extract to flavor

Flavor cream, dissolve saccharin in the boiling water, then dissolve the swelled gelatin, cool slightly, then stir into cream, taking care that no flakes of gelatin are left in the mixture. Stand on ice to stiffen.

Agar Jelly

Orange, Lemon or Coffee, Gelatin

If the carbohydrate quota has been filled use citric acid solution and sugar-free flavoring material for making gelatin dessert. Otherwise use fresh fruit juice. Agar flakes from any good drug store, or any good brand of agar-agar.

1 tsp. or 7 gms. agar-agar	½ gr. saccharin
1 cup cold water	¼ tsp. flavoring
1 tsp. mild citric acid	Coloring—as desired

Dissolve agar-agar in water. Add citric acid and saccharin. Put over flame and boil. Remove from fire—add flavoring and coloring. Put in cool place to harden. This jelly has no food value.

Orange Agar Jelly

1 serving, value, coh. 11 grams

½ cup (scant) orange juice	¼ cup cold water
1 tsp. lemon juice	2 tsps. agar flakes
2 (½ gr.) saccharin tablets	or plain agar-agar

Mix agar with cold water. Place on stove and cook until thoroughly dissolved. Dissolve saccharin in orange juice to which lemon juice has been added, and add dissolved agar. Strain into a dessert dish or mold. Cool. Place on ice to stiffen. Serve with part of the day's allowance of cream for dessert.

Coffee gelatin is made like the orange except that no lemon juice is added and the coffee is heated; the agar soaked for a few minutes in the cold water and boiled in the coffee, sweetened with saccharin, and molded as above di-

rected. Unmold and serve with cream. This gelatin has no food value except the cream poured over.

If it is desired to make a fruit jelly without food value it is necessary to use a citric acid solution (3 level teaspoons mild citric acid, powdered) to 1 pint cold water; bring to a boil, stirring until powder is dissolved and strain.

Acidulate from ½ to ¾ cup (as desired) of water with citric acid solution. Add sugar-free flavoring (about ¼ teaspoon), this may be bought in vanilla, lemon, orange, raspberry and pineapple. To this add 1½ tsps. agar, boil until agar is dissolved. Pour into molds and allow to stiffen. Serve with cream. It is desirable to color gelatin made in this way as it is white and not so attractive.

Lemon Ice

30 calories

⅓ cup water
Fruit juice, 1 lemon
¼ to ½ saccharin tablet
1 egg white

Orange Ice

75.5 calories

½ cup water
1 large or 2 small oranges
½ lemon
¼ to ½ saccharin tablet
1 egg white

Sweeten fruit juice with saccharin instead of sugar. Clip egg white with scissors, or beat with Dover egg beater, add mixture and freeze.

Ice Cream

(1) Use recipe for soft custard, freezing after the custard has become thoroughly cold.

(2) ⅓ cup cream
1 tbs. chopped nuts
¼ grain saccharin or enough to sweeten, dissolved in 1 tsp. water
3-4 drops vanilla, orange, or almond extract

Whip cream, add saccharin and nuts. Pour into a small ¼-pound baking powder can, seal the edges of mold or can with a thin strip of buttered muslin. Pack in equal parts of salt and ice for two hours.

Strawberry Ice Cream

Value: Coh. 21 gms., prot. 6 gms., fat 50 gms. (2 servings)

1 cup 20% (X) cream	½ cup strawberries

Saccharin to sweeten (about 3 or 4, ½ gr. tablets)

Crush strawberries, dissolve saccharin in juice. Stir in cream. Pour into 1 pound baking powder tin; bury in ice for 2 or 3 hours. If an individual freezer is available the freezing process is much more rapid.

A fresh peach may be substituted for the strawberries if desired.

Sugar-free Milk.—A sugar-free milk has been advised by Williamson. It is made from washed cream as follows: 3 tablespoonfuls of cream are shaken in a pint of water and set aside until the cream rises, it is then skimmed off and mixed with the white of one egg and diluted with pure water. This furnishes a beverage not unlike milk in appearance and flavor.

Maple Syrup

No food value. To be used in place of syrups, molasses, etc., which may have been used in the past.

India or pastry gum	1 level tablespoonful
Hot water	2½ cups
Moderately strong coffee	½ cup
Saccharin	4 half gr. tablets
Nutmeg essence	6 drops (sugar free)
Cinnamon essence (sugar free)	4 drops
Maple essence (sugar free)	1 teaspoon
Salt	¼ teaspoon

Add hot water to gum slowly, beat constantly to keep mixture smooth. Add rest of the ingredients. A simpler rule for maple syrup is also made by using:

1 tbs. glycerine
1 tsp. pastry gum
½ tsp. maple flavoring (sugar-free)
3 (½ gr.) tablets saccharin
½ tsp. sugar-free vanilla
1 cup hot water

Dissolve saccharin in hot water and rub pastry gum into glycerine. Add water slowly to glycerine, stirring well. Stir in the flavoring.

This rule may be turned into a maple pudding by adding 2 additional teaspoons of pastry gum and 2 tablespoons of glycerine to above rule. After mixing thoroughly boil until thick.

For the benefit of those who have no opportunity for finding out the names and addresses of the firms manufacturing or selling the articles of food mentioned in this chapter (other than those ordinarily used), the following list is given.

Cellu flour, india gum, carbohydrate-free baking powder and flavoring extracts, washed bran, prepared agar-agar, or agar jelly.—The Dietetic Supply House, 1750 West St., Chicago, Ill.

D-Zerta Jello.—The Genesee Pure Food Co., Leroy, N. Y.

Diabetic manuals: "Food for the Diabetic," by Mrs. Huddleston—Macmillan Co., New York, N. Y. "A Primer for Diabetic Patients," by Wilder—W. B. Saunders Co., Philadelphia, Pa.

RECIPES USED IN NEPHRITIC DIET

Soups

Vegetable (0.3 Points)

2 tbs. potato, chopped
2 tbs. carrots, chopped
2 tbs. turnips, chopped
2 T. butter
3 tbs. celery chopped
1 tsp. onion, chopped
1 pint water

Cook all the vegetables in butter for 3 minutes. Add the water and boil ¾ hour until vegetables are soft. NaCl. 0.144 gms., calories 298.

Creamed Vegetable (1 Point)

½ cup strained vegetables from group III, Table I
½ cup milk

Thicken with 1 or 2 tsp. cornstarch moistened in 1 tsp. cold water.

Salads

Waldorf Salad

	Wt. gm.	*Protein*	*Fat*	*Cho.*	*NaCl.*	*Cal.*
Raw apple	50	0	0	6	4	0
Chopped celery	30	0	0	1	78	0
Walnuts	20	3	13	3	14	0
Mayonnaise	20	0	20	0	0	0
		3	33	10	96	349

Combination Fruit Salad

	Wt. gm.	*Protein*	*Fat*	*Cho.*	*NaCl.*	*Cal.*
Oranges	50	0	0	6	2	0
Grapefruit	25	0	0	2	0	0
Peach	25	0	0	3	2	0
Pear	25	0	0	4	5	0
Cherries	25	0	0	5	5	0
Nuts	20	3	13	3	14	0
Mayonnaise	20	0	20	0	0	0
		3	33	22	26	397

Combination Vegetable Salad

	Wt. gm.	*Protein*	*Fat*	*Cho.*	*NaCl.*	*Cal.*
Asparagus	50	1	0	2	30	0
Tomato	50	0	0	0	2	0
Peas	20	1	0	3	8	0
Cucumbers	30	0	0	1	15	0
Mayonnaise	20	0	20	0	0	0
		2	20	8	83	226

Shamrock Salad

Green pepper, ½ medium	50 grams
Cottage cheese	30 grams
Green olives	10 grams
Mayonnaise	10 grams

Value: Prot. 7 gms., fat 13 gms., coh. 4 gms., salt .0716 gms.

Rub cottage cheese and mayonnaise together to smooth paste, chop olives very fine, add to cheese; remove seed from half pepper, press cheese mixture in firmly, place on ice to chill, slice in three slices, arrange in form of clover (4) leaf.

Fruit Salad

½ medium orange	50 grams
½ slice canned pineapple	50 grams
6 grapes	10 grams
1 tablespoon mayonnaise	15 grams
3 leaves lettuce	30 grams

Value: Protein .0, fat 10 gms., coh. 21 gms., salt .053 gms.

Perfection Salad

Gelatin, 1 tsp.	5 grams
Vinegar, 1 tsp.	5 grams
⅛ boiling water	25 grams
1 tablespoon pineapple (fresh)	15 grams
Green pepper, 1 teaspoon	5 grams
Mayonnaise, 1 tablespoon	15 grams
Lettuce, 1 leaf	15 grams
1 tablespoon cabbage	15 grams

Breads

Salt-Free Bread—White

Boiling water, 1 cup, 240 c.c.
Lard, 1 tbs., 15 grams
Sugar, 15 grams or more if desired
Fleischman's yeast, ¼ cake dissolved in a little cold H_2O
Flour, 250 grams

Put lard and sugar in a bowl. Add boiling water. While lukewarm add the dissolved yeast. Stir in 100 grams of flour and allow to stand one hour. Add 150 grams of flour and knead. Use enough flour to knead the bread smooth. Put in a bowl and allow to rise to twice its bulk. Knead down into greased pan. Allow to raise again and bake.

Whole Wheat Salt-Free Bread

Boiling water, 1 cup, 240 c.c.
Lard, 1 tbsp., 15 grams
Sugar, 15 grams
Fleischman's yeast, ½ cake
White flour, 100 grams
Whole wheat flour, 100 grams

Make same as white bread.

Soy Bean Muffin[10]

1½ cups soy bean meal
2 tsp. baking powder
2 eggs
1 cup milk
1 T. butter, S. F., melted
¼ cup English walnuts
¼ cup raisins

This recipe makes 8 muffins. Value of one muffin: coh. 10 gms., prot. 13 gms., fat 11 gms., NaCl. 0.105 gms., calories 191.

Muffins—Breakfast, Plain

	Measure	*Grams*	*Pro.*	*Fat*	*Ch.*
Flour, white	1 C.	100	11	1	75
Sugar	1 tbs.	13	..	..	13
Cream 20%	½ C.	125	4	25	6
Eggs	1	50	7	6	..
Baking powder	1 tsp.	5	..	..	..
Totals			22	32	94
Per Serving			4	5	16

Cooked weight ..; ave. no. servings, 6.

[10] Essentially basic in character and used both in the nephritic basic diet and Sansum's high carbohydrate diabetic diet.

Method.—Bake at 450 deg. F. for 20 minutes.

Beat egg, add sugar and cream, then flour and baking powder mixed and sifted. Bake as directed.

Desserts

Blanc Mange (1 Point)

½ cup milk
2½ tsp. cornstarch
¾ tbs. sugar
2 tbs. cold water
¼ vanilla

Heat milk in double boiler, add cornstarch moistened in cold water and sugar. Cook until well thickened; add vanilla and chill. Fruit from group III may be added.

Gingerbread—Soft White

	Measure	*Grams*	*Pro.*	*Fat*	*Ch.*
Eggs	1	50	7	6	..
Sugar	¼ C.	50	..	..	50
Cream 20%	⅓ C.	83	2	17	4
Flour, cake	⅞ C.	88	10	1	66
Ginger	1 tsp.	3	..	..	..
Baking powder	1½ tsp.	7	..	..	..
Totals			19	24	120
Percentage composition			9	11	58

Cooked weight ..; av. no. servings, 6.

Method.—Bake at 400° F. for 30 minutes.

Mix dry ingredients, except the sugar. Beat egg yolks until lemon colored, add sugar and cream, then flour mixture. Fold in stiffly beaten egg whites. Bake in muffin tin holding six muffins or shallow baking pan.

Cup Cakes (2=1 Point)

3 tbs. butter
¼ cup (scant) sugar
½ egg
¼ cup milk
⅔ cup flour
⅓ tsp. vanilla
1½ tsp. baking powder
(Ryzon or Dr. Price's)

Short Cake (2=1 Point)

1 1/5 cup sifted flour
½ cup (scant milk)
2 tbs. lard or butter, S. P.
2 tsp. baking powder

Mix as biscuits and make into 8 biscuits.

Custard—Baked

	Measure	*Grams*	*Pro.*	*Fat*	*Ch.*
Eggs	4	200	28	24	..
Cream 20%	1 C.	250	8	50	13
Water	1 C.	250	..	..	..
Sugar	4 tbs.	50	..	..	50
Vanilla	½ tsp.	..	..	..	..
Totals			36	74	63
Per serving			5	11	9

Cooked weight ..; no. of servings 7.

Method—Bake at 350 deg. F. for 40 minutes.

Beat eggs until creamy. Add sugar, water, cream and vanilla. Divide into seven equal portions. Bake as directed.

Custard—Soft

	Measure	*Grams*	*Pro.*	*Fat*	*Ch.*
Egg yolks	5	100	16	33	..
Sugar	4 tbs.	50	..	..	50
Cream 20%	1 C.	250	8	50	13
Water, hot	1 C.	250	..	..	..
Vanilla	1 tsp.	..	..	..	..
Totals			24	83	63
Percentage composition			4	14	11

Cooked weight ave. 598; ave. no. servings 6.

Method.—Scald cream with hot water. Place in double boiler, add sugar, and when boiling hot beat in the egg yolk which has been beaten until thick and lemon colored.

Continue cooking, stirring constantly, until mixture coats spoon. Remove from fire, add vanilla and cool.

(Care should be taken to keep the water in the lower part of the double boiler below the boiling point.)

Maple Nut Charlotte

	Measure	*Grams*	*Pro.*	*Fat*	*Ch.*
Gelatin		10	8	..	..
Maple syrup	4/5 C.	200	..	..	142
Walnuts		20	2	13	2
Water	½ C.	125	..	..	..
Cream 40%	3/5 C.	150	5	60	6
Totals			15	73	150
Percentage composition			3	17	34

Cooked weight ave. 437; ave. no. servings 5.

Method.—Pour cold water over gelatin and let soak 15 minutes. Add hot maple syrup and nuts. Cool until mixture begins to set, then beat until frothy. Fold in whipped cream. Place in molds and chill.

Chocolate Blanc Mange

	Measure	*Grams*	*Pro.*	*Fat*	*Ch.*
Cream 20%	1¼ C.	313	9	63	16
Water, hot	1¼ C.	313	..	..	..
Cornstarch	4 tbs.	35	..	..	33
Sugar	½ C.	100	..	..	100
Chocolate, bitter	1 sq.	28	4	14	8
Vanilla	1 tsp.	5	..	..	..
Totals			13	77	157
Percentage composition			2	11	22

Cooked weight ave. 723; ave. no. servings 7.

Method.—Melt chocolate, add sugar and enough of the hot water to make a creamy paste. Put cream into double boiler, add remaining water and cornstarch and cook until thick. Combine two mixtures and continue cooking until it has the consistency of whipped cream. Mould, chill and serve with custard sauce or whipped cream.

Cornstarch Cookies

Material	Amt.	Wt. Gms.	Prot. Gms.	Coh. Gms.	Fat Gms.	NaCl. Gms.	Calories
Cornstarch	1 lb.	480	..	432	..	.1440	1728
Butter	5/8 lb.	300	..		255	.0900	2295
Sugar	3 T.	45	..	45	..	..	180
Orange Juice	3 T.	45	..	4	..	.0023	16
Totals		870	..	481	255	.2363	4219

This recipe makes 30 cookies of 24 grams each. Each cookie containing 16 gms. coh., 9 gms. fat, .0787 gms. salt and 141 calories.

Cornstarch Pudding (1 serving) for Non-Protein Diet

Household Measure	*Metric System*
4 tablespoons water	60 grams
1 teaspoon cornstarch	5 grams
2 teaspoons sugar	10 grams
2 teaspoons butter	10 grams

Mix water, cornstarch and sugar. Place on fire, stirring constantly. After mixture thickens to consistency desired remove and add butter. Cool and flavor with fruit juices or vanilla. Food value, 1 serving, protein 0, fat 8.5, carbohydrate 14.5 gms.

Date and Nut Pudding

	Measure	*Grams*	*Pro.*	*Fat*	*Ch.*
Dates, dried and stoned	2/3 box	190	4	6	148
Walnuts, California	½ C.	70	13	45	8
Eggs	4	200	28	24	..
Sugar	½ C.	100	..	..	100
Bread crumbs	6 tbs.	60	7	1	37
Baking powder	1½ tsp.	..	..	..	..
Vanilla	1 tsp.	..	..	..	..
Totals			52	76	293
Percentage composition			9	14	53

Cooked weight 549; av. no. servings 8.

Method.—Bake at 400° F. for 30 minutes.

Beat egg yolks, add sugar, bread crumbs, chopped nuts and dates, baking powder and vanilla. Fold into this mixture stiffly beaten egg whites. Bake in loaf pan as directed.

Tapioca Cream

	Measure	*Grams*	*Pro.*	*Fat*	*Ch.*
Cream 20%	1 C.	250	8	50	13
Water, cold	1 C.	250	..	..	..
Tapioca, dry	3 tbs.	20	..	..	18
Sugar	½ C.	100	..	..	100
Eggs	2	100	14	12	..
Vanilla	½ tsp.	..	..	..	..
Totals			22	62	131
Percentage composition			4	10	21

Cooked weight ave. 617; ave. no. servings 6.

Method.—Cook tapioca in water and add cream. Beat egg yolks until thick and mix with sugar.

Combine mixtures and continue cooking until creamy. Add vanilla and fold in stiffly beaten egg whites. Chill before serving.

Tapioca Pudding (High Calorie)

	Measure	*Grams*	*Pro.*	*Fat*	*Ch.*
Egg yolk	2	40	6.4	13	..
Cream 40%	1/5 C.	50	1.5	20	2
Tapioca, pearled	2 tbs.	15	..	..	13
Sugar	1 tbs.	15	..	..	15
Water	3 tbs.	50	..	..	..
Totals			7.9	33	30
Percentage serving			7.9	33	30

Cooked weight ..; ave. no. servings 1.

Method.—Cook tapioca in water until tender, add the sugar and cream and when very hot add the egg yolks beaten until lemon colored. When thick remove from fire, add vanilla and chill.

Apricot Souffle

	Measure	*Grams*	*Pro.*	*Fat*	*Ch.*
Butter	2 tbs.	35	..	30	..
Flour	3 tbs.	40	4	..	30
Apricots canned in sugar	8-11 ½s	150	2	..	45
Eggs	4	200	28	24	50
Cream 20%	½ C.	125	4	25	6
Water	½ C.	125	..	..	..
Sugar	4 tbs.	50	..	..	50
Totals			38	79	131
Percentage composition			6	13	21

Cooked weight ave. 609; ave. no. servings 8.

Method.—Bake at 400° F. for 60 minutes.

Melt butter, add flour, then cream. Cook in double boiler until thick. Add beaten egg yolks and sugar. Cool and fold in egg whites beaten until stiff and dry.

Place apricots in the bottom of a deep buttered baking dish. Pour above mixture over them and bake as directed.

RECIPES USED IN PERNICIOUS ANEMIA

Liver, sweetbreads, heart, kidney, are all glandular organs, rich in iron and purin and therefore may be used with advantage in pernicious anemia, these organs likewise contain vitamin "A."

Sliced Liver

Prot. 25 gms., coh. 9 gms., fat 21 gms., cal. 325

¼ lb. liver, sliced (120 gms.)
1 small onion (20 gms.), 2 tsp. flour (7 gms.)
1 T. bacon or other fat, salt and pepper to season

Slice liver and onion. Dredge liver with salt, pepper and flour. Place fat in small fry pan, when hot fry the liver until brown on both sides, push aside and fry onion until it begins to yellow, cover and cook 10 to 15 minutes and serve.

Liver Loaf

Value of 1 service, prot. 22 gms., coh. 9 gms., fat 7 gms., cal. 188.

1 pound liver (480 gms.)
1 cup (240 c.c.) milk
1 egg (whole)
2 T. chopped celery
2 long strips bacon
1 medium onion (30 gms.)
3 T. flour (30 gms.)
1 T. parsley (chopped)
Salt (¼ tsp.)
⅛ tsp. pepper

Pass liver, celery, parsley and onion through food chopper (fine blade used or pass twice through chopper). Heat milk in double boiler, add flour, cook until it begins to thicken, add beaten egg, cook until very thick, add finely chopped mixture, salt and pepper. Pour into pan and allow to stiffen, when cold, mold into loaf, place in loaf pan with bacon across top, bake slowly for 1 hour. This loaf may be served either hot or cold.

Value: Prot. 111 gms., coh. 46 gms., fat 35 gms., calories 943 (1/5 of loaf=1 service).

Liver Loaf

½ lb. beef liver
(soak in cold water)
⅓ medium size onion
⅓ cup cracker crumbs
1 small egg
⅓ cup hot water
⅓ tsp. salt
1 T. butter or fat

After soaking the liver in cold water, place in boiling salted water and cook until tender, cool, and pass with onion through fine grinder. Brown crumbs in butter or other fat (usually bacon drippings), then mix with liver and onion, add salt and egg. Form into loaf, bake until browned (strips of bacon may be placed on top if desired). This loaf may be served hot or cold.

Value: 58 gms. prot., 27 gms. coh., 49 gms., fat, 821 cal.

Stuffed Heart

Remove veins and arteries from calf's heart, stuff with following:

1 cup fine bread crumbs
2 stalks celery
1 tbs. butter (melted)
1 small onion
1 sprig parsley
1 egg (small)

Chop onion, parsley and celery fine, mix with crumbs, brown lightly in butter, add egg, stuff heart, dredge with salt, pepper and flour, brown in hot fat, then place in roasting pan, half cover with water to which the juice of 1 lemon has been added, cover and bake slowly for 2 hours, basting frequently, add more water if necessary.

Casserole of Liver with Vegetables (2 portions)

¼ lb. (120 gms.) calf's liver	½ small onion
1 carrot, 1 potato (small)	2 T. flour, 1 T. butter
1 stalk celery	Salt (¼ tsp.), dash pepper

Soak liver in cold water for 1 hour, cut in small pieces (½″ x ½″ x ½″), dredge with salt and pepper and flour, and brown lightly in hot fat (not enough to cook thoroughly, simply brown over), slice celery, carrot and onion and cook for 10 minutes in boiling salted water, place in layers with liver in individual baking dish, add butter, and a few spoonsful of water in which vegetables were cooked, cover and bake slowly 1 hour (or until liver and vegetables are tender).

Each portion contains: Prot. 25 gms., coh. 69 gms., fat 22 gms., cal. 322.

Broiled Liver

Dash liver in hot water, remove the skin and broil until done, or pan broil in mineral oil. Five minutes are generally allowed for cooking.

Scraped or Sieved Liver

Dash liver in hot water and remove the skin. Boil the liver 5-10 minutes (until cooked) and scrape through sieve.

Liver Stuffed in Green Peppers or Tomatoes

Stuff sieved or finely chopped liver (cooked) which has been moistened with tomato juice or broth in the tomato or green pepper and bake. Onion may be added to the chopped

liver for flavor. One pepper or tomato will hold 60 grams of liver.

Liver Soup

Add 120 grams of scraped or sieved liver to 200 c.c. of clear tomato or chicken broth with fat removed. Season with onion if desired.

Liver Soup (Cream)

120 grams chopped liver	4 tsp. flour
220 c.c. milk	10 grams butter

Make white sauce and add liver

Liver Aspic

Steam liver in chicken broth until soft. Cut up liver or push through strainer (the latter makes a creamy product; the former, forming lumps of jelly and lumps of liver, is usually preferred). Season with salt and a very little sugar. Use 1 tablespoon gelatin to 1 quart chicken broth and add liver to it. Set in molds. Tomato broth may be substituted for chicken broth.

Decorate with parsley or white of egg. May be served on lettuce. One custard cup holds about 30 grams of liver.

Artichoke Stuffed with Sweetbreads

Value: Prot. 7 gms., coh. 5 gms., fat 7 gms., cal. 111

1 medium size artichoke (French)
½ of 1 sweetbread (30 grams)
1 T. canned (25 grams) mushrooms
1 T. chopped celery
2 T. medium (No. 2) white sauce
Salt and pepper to season.

Parboil sweetbread in water acidulated with lemon juice (remove skin) and cut in cubes, boil celery until tender, add to sweetbread and chopped mushrooms, add white sauce. Boil artichoke until tender, carefully lift out the center and remove the choke taking care not to break the bottom (but-

ton), scrape the edible part from the leaves removed from center and add to sweetbread mixture, season with salt and pepper, fill the artichoke; place in double boiler over hot water to heat thoroughly and serve.

Sweetbreads with Spaghetti and Mushrooms

¼ c. cooked spaghetti (33 grams)
1 T. chopped fresh mushrooms (canned may be substituted if desired)
½ of 1 sweetbread (about 30 grams)
2 T. milk or cream
½ T. butter
1 tsp. flour, salt and pepper to season

Boil spaghetti until tender. Boil sweetbreads in acidulated water until tender. Sauté the mushrooms in butter, lift out mushrooms and add flour, cook until light brown, then stir in milk or cream, cook until consistency of cream. Place spaghetti on hot plate, mix mushrooms and sweetbread cubes together and place in center of spaghetti, season and serve.

Value: Prot. 6 gms., coh. 4 gms., fat 14 gms., calories 166.

DIET FOR EPILEPTICS
(Ketogenic)

Bran Biscuits

½ cup wheat bran
½ cup improved graham flour
1 teaspoon baking powder
1 teaspoon melted butter
1 teaspoon salt, milk

Sift dry ingredients, rub in the butter and add milk to make a soft dough. Roll out and bake in hot oven.

Bran Mashed Potatoes

2 cups hot mashed potatoes freshly prepared
¼ teaspoon pepper
¼ teaspoon salt
1 to 3 tablespoons butter
⅓ to ¾ cup hot milk or cream
½ cup bran

Add the four seasonings to the potatoes and whip mixture until light. Stir in bran and serve.

Bran Griddle Cakes

1 cup bran
1 tablespoon sugar
½ tablespoon butter
1 cup flour
½ teaspoon salt
1 cup milk
1 egg

Mix dry materials. Add egg slightly beaten, then milk and butter. Beat thoroughly and bake on hot griddle. This amount will make 20 cakes.

Bran Soya Muffins [11]

		Coh.	*Protein*	*Fat*
Baker's bran	30 grams	8.0	3.0	2.0
Soya manna	50 grams	0	21.0	10.0
Eggs	4	0	24.0	24.0
Butter	55 grams	0	0	47.0
Baking powder	1 teaspoonful	0	0	0
Salt	½ teaspoonful	0	0	0
Water	¾ cupful	0	0	0
Food value of recipe		8.0	48.0	83.0
Food value of each muffin		0.6	4.0	7.0

Mix dry ingredients. Melt butter. Add water and melted butter to the mixture. Beat whites of eggs very stiff and fold them into the mixture. Bake in twelve muffin tins.

One-half recipe may be used and baked in twelve small muffin tins. Food value of one muffin is 0.3 grams carbohydrate, 2 grams protein, 3.5 grams fat.

Creamed Soups—High Fats

Creamed Clam

	Amt.	*Protein*	*Fat*	*Coh.*
Cream (pastry 36%)	60 c.c.	1.2	21.6	1.8
Minced Clams	30 gms.	3.	0	.9
Onion	10 gms.	.1	0	.18
Water	50 c.c.	0	0	0
Salt		0	0	0
		4.3	21.6	2.88

[11] Courtesy of Miss Florence Smith, St. Mary's Hospital.

Oyster Stew [12]

	Protein	Fat	Coh.
Cream (pastry 36%) ....60 c.c.	1.2	21.6	1.8
Oysters ....20 gms.	.4	.6	.2
Water .... 3 oz.			
	1.6	22.2	2.0

Cream Chicken Soup [12]

	Protein	Fat	Coh.
Cream (pastry 36%) ....60 c.c.	1.2	21.6	1.8
Onion ....10 gms.	.1		.18
Ground chicken ....30 gms.	7.5	.9	
Water .... 2 oz.			
Celery salt			
	8.8	22.5	1.98

Cream of Lettuce and Onion Soup [12]

	Protein	Fat	Coh.
Cream (pastry 36%) ....60 c.c.	1.2	21.6	1.8
Cooked onion ....60 gms.	.5		2.4
Lettuce ....100 gms.	1.		1.
	2.7	21.6	5.2

Cream of Carrot Soup [12]

	Protein	Fat	Coh.
Cream (pastry 36%) ....60 c.c.	1.2	21.6	1.8
Carrots (purée) ....50 gms.	.6		3.
Water .... 2 oz.			
	1.8	21.6	4.8

Cream of Peanut Butter Soup [12]

	Protein	Fat	Coh.
Cream (pastry 36%) ....60 c.c.	1.2	21.6	1.8
Peanut butter ....15 gms.	4.3	6.9	1.5
Water .... 3 oz.			
	5.5	28.5	3.3

[12] Courtesy of Miss Charlotte Sloan, Stanford University Hospital, San Francisco, Calif.

Cream of Tomato Soup

		Coh.	Protein	Fat
Fresh or canned tomato	50 gms.	1.5	0.5	0
Soda	Few grains	0	0	0
Cream (40%)	100 gms.	3.0	2.0	40.0
Salt	½ tsp.	0	0	0
Butter	12 gms.	0	0	10.0
Food value of recipe		4.5	2.5	50.0

Heat tomato and cream separately. Add soda to tomato. Add tomato slowly to hot cream. Add butter and salt. Serve immediately.

Ice Cream

		Coh.	Protein	Fat
Cream (40%)	100 gms.	3.0	2.0	40.0
Egg	1	0	6.0	6.0
Water	½ tbs.	0	0	0
Saccharin	½ grain	0	0	0
Vanilla	⅓ tsp.	0	0	0
Food value of recipe		3.0	8.0	46.0

Beat the yolk of egg very light. Add cream slowly. Fold in beaten white of egg. Then add vanilla and saccharin which has been dissolved in ½ tablespoonful of water. Freeze.

Chocolate Ice Cream

		Coh.	Protein	Fat
Cream (40%)	100 gms.	3.0	2.0	40.0
Egg yolk	1	0	2.0	6.0
Cocoa	5 gms.	2.0	1.0	1.5
Water	¼ cupful	0	0	0
Saccharin	½ grain	0	0	0
Food value of recipe		5.0	5.0	47.5

Beat yolk of egg until very light and add one-half the cream. Mix cocoa and water together and boil for three minutes. Add the remainder of the cream and reheat.

Allow this mixture to cool and then add to egg yolk and cream mixture to which has been added the saccharin. A few drops of vanilla may be added if desired. Freeze.

D'Zerta Bavarian

		Coh.	*Protein*	*Fat*
Raspberry D'Zerta	1 envelope	0	2.0	0
Cream (40%)	50 gms.	1.5	1.0	20.0
Boiling water	⅓ cupful	0	0	0
Food value of recipe		1.5	3.0	20.0

Dissolve the contents of one envelope of D'Zerta in ½ cupful of boiling water. When D'Zerta begins to thicken, add cream and beat until D'Zerta and cream are thoroughly mixed. Put into mold and chill.

SECTION III

THE HUMAN MACHINE

CHAPTER VII

THE HUMAN BODY

This chapter on "The Human Body," is included here because it serves a purpose, refreshing the mind of the nurse on the physiology of digestion, as well as the metabolism and elimination of food. The following chapters on the dietetic treatment of the various diseases require this knowledge for intelligent handling. Hence, the detailed account of the body processes, together with the diagram which will serve to make the subject concrete.

Chemical Composition of the Body.—It has been estimated by various writers that the human body has an approximate average chemical composition[1] of—

Oxygen	about 65	per cent
Carbon	about 18	per cent
Hydrogen	about 10	per cent
Nitrogen	about 3	per cent
Calcium	about 2	per cent
Phosphorus	about 1	per cent
Potassium	about 0.35	per cent
Sulphur	about 0.25	per cent
Sodium	about 0.15	per cent
Chlorine	about 0.15	per cent
Magnesium	about 0.05	per cent
Iron	about 0.004	per cent
Iodine, Fluorine, Silicon	very minute quantities	

Dependence of the body upon Food.—The human body, like any other piece of machinery, undergoes a constant wear and tear incidental to the work it performs, but in the human machine this is not all that must be included

[1] "Chemistry of Food and Nutrition," by Henry Sherman.

in its upkeep. The replacing of the dead and cast out cells with new ones, the repairing of the worn cells, the furnishing of heat, not only for the running of the engine but for the maintenance of the body temperature,—all of these must be considered and cared for if life is to continue. In man-made machinery, the renewal of the worn parts, and the replacing of those no longer useful must be accomplished by an outside agency. But in the body this work is performed by the organism; and the material used for the purpose, as well as that which is used to furnish the heat necessary for the internal and external activities of the body is food.

Exceptions to this Rule.—Under normal conditions the body never uses its own structure either for fuel or to replace tissue losses. In starvation the body rebuilds its important tissues, such as the nerves and glands, at the expense of the less important ones, such as the connective tissues and the skeletal muscles (Taylor).

Science has proved that for the most part the body does not use the food materials in their original form, but carries them through a series of transformations into substances more easily handled by the organism.

Roughly speaking, we may say that the body carries the foodstuffs through practically four processes on the pathway through the body, namely, digestion, absorption, metabolism, elimination.

Processes Included in Digestion.—There are several processes concerned in this transformation of the food materials. Some are purely mechanical and have to do with the movement of the food mass through the digestive tract: others are of a chemical character and bring about distinct changes in the food materials themselves. These mechanical and chemical processes with the retarding and stimulating agents that influence them are called digestion.

Absorption.—After the food materials have undergone

digestion, or simplification into more available substances, these substances are absorbed, that is, they are passed through the membranes lining the walls of the intestinal tract, and thence to the blood.

Metabolism.—The utilization of the transformed food materials and their final fate in the human body is included under the term Metabolism.

Elimination.—After the food materials have been utilized to the extent of the body's ability to handle them, their waste products are cast out of the organism by way of the skin, the lungs, the intestines and the kidneys.

A brief description of these processes seems desirable here.

Digestion.—Mechanical digestion begins in the mouth, where through the action of the teeth, the tongue and the muscles of the jaw, the food material is ground up and liquefied to a certain extent and made ready for the chemical action which takes place, to a limited degree only, as a result of the salivary enzyme in the mouth. The eating of food causes a flow of saliva from the three pairs of large salivary glands, and from the numerous secretory cells situated in the membranes of the mouth. As a rule the food stays for too short a time in this organ for any appreciable amount of chemical action to take place, but the liquefaction of the food mass with the salivary juices which contain the ferment (ptyalin), prepares for its passage into the gastric organ, and allows the digestion of the starch (the only foodstuff affected by salivary digestant), to continue in that part of the stomach until its action is checked by the hydrochloric acid in the gastric juice.

Arrangement of Food in the Stomach.—To simplify the study of the gastric organs it may be well to think of the stomach as being divided into three regions, *i.e.*, "the fundus, the middle region, and the pyloric end," [2] each of

[2] "Chemistry of Food and Nutrition," by Sherman.

which differs slightly from the other. After being swallowed, the food enters the region situated at the cardiac end, known as the fundus.

Motor Processes in the Stomach.—There are no peristaltic waves in the fundus of the stomach, and the movement of the food-mass is accomplished through the stretching and contraction of the muscular walls of the organ which tends to churn and further mix it with the salivary juices as it is gently pushed out into the middle region. In this region the peristaltic waves begin and travel toward the pylorus and increase in force as digestion progresses, ceasing only with the emptying of the organ. When the first stratum of food reaches the middle of the stomach it is caught by these oscillating peristaltic waves and forced forward through the pyloric region and against the pylorus, from whence it is returned back through rings of constriction. This forward and backward movement continues as long as there is food in the stomach, thus thoroughly mixing the mass with the gastric juice and allowing the enzymes existing in the juices to have an opportunity for action (chemical digestion).

Passage of Food from Stomach.—The material prepared in the stomach, known as **chyme,** is passed into the duodenum through the pylorus. The opening of this sphincter is controlled, according to Cannon, to a certain extent by the liquefication of the chyme, but more especially by the presence of free acid in the stomach side of the pyloric orifice.

Behavior of Food in the Intestines.—The food does not pass at once along the canal, but waits in the duodenum until several portions have passed through. As the food mass is made alkaline in the presence of the intestinal juices, the pyloric valve closes, opening again as the contents nearest it on the stomach side are acidified.

Intestinal Movements.—The peristaltic waves in the

small intestines begin in the upper part and start a course ever downward. These waves in the intestines are twofold in character; the quick shallow wave which forces the food string forward, breaking it up into segments, and backward joining the segments together again, and the strong deep wave which carries the entire mass forward after each segmentation. This method of movement in the small intestines is the best one possible under the conditions which prevail in this region of the digestional apparatus, since it not only mixes the food material with the juices necessary for its digestion, but likewise spreads it out over a wide space, insuring a greater contact with the absorbing walls of the small intestines.

The Effect of Muscular Constrictions.—The muscular constrictions occurring in the intestines producing segmentation of the food string have, according to Sherman, the effect of "(1) further mixing of the food and digestive juices, (2) bringing the digested food into contact with the absorbing membrane, (3) emptying the venous and lymphatic radicles in the membrane, the material which they have absorbed being forced into the veins and lymph vessels by the compression of the intestinal walls." [3]

Movements in the Large Intestine.—The movements in the large intestine or colon are much like those in other parts of the digestive tract. The small and large intestine are divided by a valve known as the ileocecal valve, and any food which passes through it cannot return, since the valve is a competent one. The cells in the walls of the larger intestine secrete fluids of a lubricating character, containing no enzymes of digestion but aiding in moving the fecal matter toward the rectum.

Distribution of Secretory Cells.—Secretory cells are distributed in each of the three regions of the stomach, but are more numerous in the middle region than at either end.

[3] "Chemistry of Food and Nutrition," by Henry Sherman.

The third region includes the pyloric vestibule through which all foods must pass before they can enter the small intestine, and terminates in the pylorus, the valve which shuts off the stomach from the duodenum and the rest of the intestinal canal.

Chemical Digestion.—The chemical changes in the food materials, after they are eaten, are brought about through the action of certain substances known as soluble ferments or "enzymes." These enzymes exist in every tissue of the body, and their province is first to break down the food materials themselves into simpler compounds, and then to reconstruct the simpler substances into those of a more complex character, which are more available for the various uses of the organism.

Action of the Enzymes.—As Sherman has stated, "all fermentation is brought about either directly or indirectly by the activity of animal or vegetable organisms or cells. When the organisms or cells act directly and the chemical changes occur only in their presence, the fermentation is said to be due to an organized ferment. When the action is not brought about directly by the cell itself, but by means of a substance secreted by the cell but acting apart from it, this substance is called a soluble or unorganized ferment or 'enzyme.'" The enzymes concerned in digestion and metabolism, their source and their action, may be found in the following table:

TABLE OF ENZYMES[4]

Source and Action of Enzymes

	Enzymes	*Where chiefly found*	*Action*
Act upon carbohydrates	Ptyalin (salivary amylase)	Salivary secretions	Converts starch to maltose
	Amylopsin (pancreatic amylase)	Pancreatic juice	Converts starch to maltose
	Liver diastase	Liver	Converts glycogen to glucose
	Muscle diastase	Muscles	Converts glycogen to glucose
	Invertase (sucrase)	Intestinal juice	Converts sucrose to glucose and fructose
	Maltase	Intestinal juice	Converts maltose to glucose
	Lactase	Intestinal juice	Converts lactose to glucose and galactose
	Glycolytic enzymes	Muscles, etc.	Split and oxidize glucose
Act on fats	Lipase (steapsin)	Gastric, and pancreatic secretions, blood and tissues	Splits fats to fatty acids and glycerin
Act on proteins	Pepsin	Gastric juice	Splits proteins to proteoses and peptones
	Trypsin	Pancreatic juice	Splits proteins to proteoses, peptones, polypeptids and amino acids
	Erepsin	Intestinal juice	Splits peptones to amino acids and ammonia
	Autolytic enzymes	Tissue generally	Split body proteins to simpler substances
Act on purins	Guanase	Thymus, adrenals, pancreas	Changes guanin to xanthin
	Adenase	Spleen, pancreas, liver	Changes adenin to hypoxanthin
	Oxidases	Lungs, liver, muscles, etc.	Changes hypoxanthin to xanthin and to uric acid

[4] Compiled from "Textbook of Physiology," by Howell, and "Chemistry of Food and Nutrition," by Sherman.

Classification of Enzymes. — Sherman classifies the enzymes of the body according to their effects:

1. The hydrolytic enzymes:
   (*a*) Proteolytic or protein-splitting enzymes.
   (*b*) Lipolytic or fat-splitting enzymes.
   (*c*) Amylolytic or starch-splitting enzymes.
   (*d*) Sugar-splitting enzymes.
2. The coagulating enzymes, such as thrombin or thrombase (the fibrin ferment) and rennin, which causes the clotting of milk.
3. The oxidizing enzymes or oxidases (which, if the oxidation be accompanied by a splitting off of amino groups, may be called "deaminizing" enzymes).
4. The reducing enzymes or "reductases."
5. Those which produce carbon dioxid without the use of free "deamidizing" oxygen, such as zymase of yeast.
6. Enzymes causing the breaking down of a larger into a smaller molecule of the same composition, as in the production of lactic acid from glucose.

Digestion (Chemical)

Salivary Digestion. — The table shows that enzymic action begins in the mouth. Saliva, the characteristic secretion of this region, contains the enzyme ptyalin which exerts its influence upon the starches and dextrins. The food mass remains in the mouth for so short a time, however, that a very small percentage of the starch is changed to maltose under salivary digestion. The action of ptyalin, however, continues in the fundus of the stomach until stopped by the acid in the gastric juice.

Gastric Digestion. — The conditions existing in this region of the gastric organ of digestion are particularly favorable to the continuance of salivary digestion on account of the neutral character of the juices secreted by the cells there, and because there is so little movement taking

place. The cells in the middle region, however, secrete a fluid rich in acid, and as the food mass is gradually pushed forward by the contraction of the stomach walls into this portion of the stomach, further conversion of starch and dextrin to maltose is checked. Gastric juice is secreted by cells situated in all parts of the stomach. The character of the secretions differs in different parts of the organ however; that in the fundus is neutral in character or even slightly alkaline, according to Howell, while that in the middle region is highly acid. The pyloric end of the stomach exhibits strong peptonizing powers and much of the hydrolysis of protein takes place here. As the food is pushed out of the fundus it is caught by the waves of peristaltic action and swept toward the pylorus. This movement of the food mass to and from the pylorus under the influence of the muscular constriction in the stomach tends to mix it thoroughly with the juices in all parts of the stomach, and in a measure to liquefy it to the "souplike" mixture known as chyme.

Secretion of Water in the Stomach.—The secretion of water by the cells of the stomach is such, according to Taylor, as to produce chyme of quite constant consistency, the solid particles being held in suspension in the fluid medium.

Factors Influencing Gastric Digestion.—The factors influencing digestion in the stomach constitute all those mechanical, electrical, chemical, and psychical factors which stimulate or retard the action of the gastric juices. The movements in the stomach are involuntary, but their activities may be stimulated by the flow of gastric juice. Sleep retards digestion in the stomach by retarding the movements in the organ itself.

Stimuli to Gastric Flow.—The division and liquefaction of the food in the mouth hastens gastric digestion by making the food better fitted for the action of the enzymes

in the gastric juice. The type as well as the character of the food acts as a stimulus to the gastric secretion.

Water is probably the best of all the agents for stimulating the secretion of gastric juice, while **dextrin** (toast, zwieback) and the **extractives of meat** likewise exert similar powers.

Retarding the Gastric Flow.—The nervous system, on the other hand, at times checks or entirely inhibits a flow of these juices. Worry, excitement, anger, fatigue, chill, each plays its part in promoting poor digestion in the gastric organ. As chemical factors, water and salts are the two necessary substances for gastric digestion, since the enzymes in the juices cannot act except in their presence.

Alkaline carbonates and **fatty foods** both check the flow of gastric juice, and retard digestion. The psychic factors which result in a stimulation of the secretory cells in the stomach are exerted through the sight, smell, and taste. One often hears the expression: "The food looked, smelled, or tasted so good that it made my mouth water." This actually occurs; hence the secretion has been named appetite juice. This appetite juice acts as a direct stimulant to the cells in the mucous lining of the stomach, causing a flow of gastric juice. It cannot be said to cause digestion, but it certainly institutes that process, thus starting the whole digestional procedure.

Rate of Carbohydrates, Proteins, and Fats.—Carbohydrates, for example, do not require any acid for their digestion, hence all of the acid with which they come in contact can go toward acidifying them, while the proteins require hydrochloric acid before the enzymes can begin to exert their activities. Consequently they leave the stomach much more slowly than the carbohydrates. The fats leave more slowly than any of the other food combinations. If carbohydrates and proteins are taken together they leave the stomach more slowly than if the carbohydrates were fed alone, but more

quickly than they would if the meal consisted of protein alone. When the meal consists of fats and proteins, the stomach is emptied more slowly than is the case when either is fed alone.

Intestinal Digestion.—Digestion proceeds in an orderly manner throughout the intestinal canal. The pancreatic juice, bile, and intestinal juice are poured upon the food mass on its entrance into the duodenum. The enzymes work simultaneously. *Trypsin* in the pancreatic juice takes up the hydrolysis of the proteoses and peptones and those proteins which have escaped gastric digestion. The *amylopsin* likewise in the pancreatic secretion acts upon the starch and dextrin, changing them to maltose. The lipases split the fats to fatty acids and glycerol.

The *erepsin* in the intestinal juice, "succus entericus," brings about further change in the proteins, with the production of amino acids. The bulk of the carbohydrates are converted into monosaccarids in the small intestines. The lactose, maltose, and sucrose are changed through the activity of the lactase, maltase, and invertase into glucose. Sherman states that "it is possible that the splitting of the lactose (milk sugar) may occur in the intestinal wall rather than in the food mass." [5]

Bile.—Human bile, the secretion most actively concerned in the digestion and absorption of the fats, contains water, bile salts, bile acids, bile pigments, cholesterin, lecithin, and a peculiar protein derived from the mucous membranes of the bile ducts and gall bladder.

Stimulation of Intestinal Secretions.—The flow of the intestinal juices is stimulated by a substance or *hormone* known as "**secretin.**" This hormone is the result of the action of hydrochloric acid upon some substance in the intestinal wall. Startling claims that the formation of hor-

[5] "Chemistry of Food and Nutrition," by Henry Sherman.

mones and their circulation through the blood to the reactive tissues is sufficient to account for the activity of the pancreas; he doubts if the nervous system plays any part in the activity of that organ.

Digestion in the Larger Intestine.—Science has proved that most of the nourishing part of the food ingested is digested and absorbed before it reaches the larger intestine. The two portions of the alimentary canal known as the small and large intestine are separated by the ileocecal valve. Cannon claims "that this valve is competent, that is, under normal conditions the food mass which passes through into the colon cannot be forced back into the small intestine." The food mass sometimes contains materials which have escaped digestion, likewise some of the active enzymes which bring about their hydrolysis, in which case a certain amount of their digestion may continue in the large intestine.

So far, investigators have found no enzymes in the fluids secreted by the cells in the walls of the large intestine, but they have found an alkaline fluid which assists in completing the digestion of the foods which has started in other parts of the intestinal tract.

Absorption.—Absorption of food occurs in all parts of the intestinal canal, but the major portion of it occurs in the small intestines, the mucous membrane lining of which seems particularly adapted for this purpose. According to Taylor there is no absorption of fats, carbohydrates, or proteins in the stomach. Other investigators believe that some of the protein is absorbed and also some glucose in concentrated solution. However, the stomach cannot be considered of great value as an absorbing organ. Physiology teaches that the absorption of the products of digestion occurs by means of the millions of small projections or villi with which the intestinal wall is lined. These villi contain numerous capillary blood vessels and spaces known as lac-

teals. The former converge into the portal vein, the latter into the lymphatic vessels and thence into the thoracic ducts.

The Absorption of Fat. — The fats, as has been described, are split into their two constituents, fatty acid and glycerol. The former is dissolved by the bile to form soap; the latter is readily soluble in water. These constituents thus dissolved pass through the walls and recombine in the form of neutral fat droplets, probably during the passage through the walls, since they appear in this form in the cells. They pass into the thoracic duct and thence into the blood stream.

Absorption of Carbohydrates. — The carbohydrates are chiefly absorbed in the form of monosaccharids. This has been proved by introducing cane sugar or lactose into the blood vessels and getting the greater portion of it back unchanged by way of the urine. As the monosaccharids are taken up by the capillaries lining the walls of the small intestines, they are passed on to the portal vein and carried by the portal blood into the liver, where they are stored temporarily as glycogen, and given out to the blood in the form of glucose as needed. After a meal rich in carbohydrates, the portal blood will be rich in glucose, while the blood in general circulation contains about the same amount as usual, about 0.1 per cent.

Absorption of Proteins. — The absorption of the products of protein digestion occurs through the capillary blood vessels and passes on to the portal vein. The metabolism of protein is more complex than that of any of the foodstuffs. It is probable that each living cell contains enzymes which are capable of breaking down the body proteins with the production of amino acids just as the proteins of the food are broken down by enzymes of digestion, and according to Sherman "it is not improbable that protein synthesis also may be brought about by every living cell."

The Absorption of Water. — This does not occur in

the stomach, as was formerly believed, but in the small intestines.

The Absorption of the Mineral Salts.— This occurs in conjunction with the other food material. Some of the mineral salts are much more soluble than others and are more readily absorbed. The function of the mineral salts in the body has already been described, and since they form a part of every tissue and fluid in the body their absorption and fate in metabolism must be studied with that of the other chemical combinations.

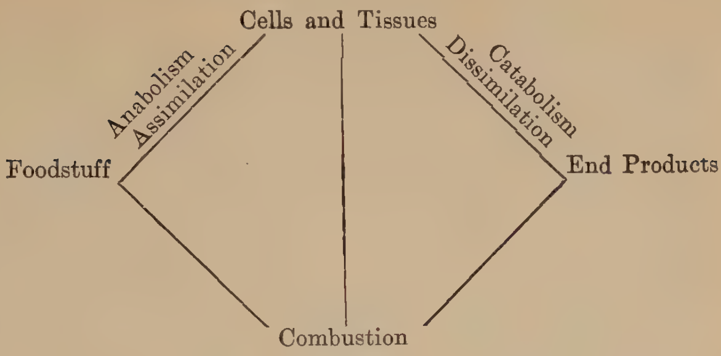
ABSORPTION IN THE LARGE INTESTINES

The digestion of the food as it is passed into the last portion of the alimentary canal has been largely completed. However, that part which has escaped digestion in the small intestine is finished and absorbed here. The important peristaltic waves occurring in this region are antiperistaltic in character and have the property of churning the food thoroughly and bringing a larger portion of it in contact with the absorbing walls. The water which is left in the food mass together with the products of the digestion of the foodstuffs is absorbed in the first part of the large intestine, leaving the remainder more solid. This residue is known as feces or fecal matter.

The diagram on page 209 shows the various processes through which the foodstuffs pass after absorption.[6]

Bacterial Action in the Alimentary Canal. — The changes in the foods so far mentioned have been chiefly the result of the activity of the enzymes existing in the various digestive processes throughout the body. But there are other changes which occur in the foods during their sojourn in the digestive tract which are not accountable to enzymic

[6] This scheme applies to the protein, fat and carbohydrates with quantitative variations only. Courtesy of Dr. A. R. Taylor, Leland Stanford University.



action, but which, in fact, modify to a certain degree the changes wrought by the enzymes. These are the result of the activity of certain specific bacteria which inhabit the entire digestive tract of the individual from a few hours after birth until death. Some of these have so adapted themselves to the existing conditions that, unless present in overwhelming numbers, they are not only harmless, but they actually assist in protecting the organism from the inroads of more harmful species. Many experiments have been made to find whether or not bacteria are essential to human nutrition, and the results of these experiments prove that they are not. However, since they are so firmly established in the body it is well to study the various types and learn as much as possible of the products of their activity and the influence which they exert in human nutrition.

Types of Bacteria. — It would be impossible and unnecessary to consider the action of all of the bacteria in the body in this text, but it is necessary to consider those which are prominent in bringing about decomposition of the foods in the digestive tract. Sherman holds that there are three main types having this property: "(1) the bacteria of fermentation, such, for example, as the lactic acid bacteria; (2) the putrefactive bacteria, such as the anaërobic B. aërogenes capsulatus; (3) bacteria of the B. coli type, show-

ing the character of both the fermentative and putrefactive organisms but tending in general to antagonize the putrefactive anaërobes." [7]

Fermentation in the Stomach. — In the stomach, fermentation of the carbohydrates with the production of organic acids, and at times alcohol, occurs. The types of fermentation taking place in the stomach are alcoholic, lactic, butyric, acetic, formic, oxalic, and cellulose. The bacteria inhabiting the gastric organs are dependent upon air for existence, while those in the intestines are not.

Factors Influencing Excessive Fermentation. — The factors influencing excessive fermentation in the stomach are lack of "tone" and motility in the organ, insufficient amount or absence of free hydrochloric acid in the gastric secretion, dilatation of the stomach, and an excess of carbohydrate foods in the diet. Of the latter, sucrose and glucose are especially susceptible to the action of fermentative bacteria. Under normal conditions, that is, in health, the conditions prevailing in the stomach are very unfavorable to the development of bacteria of the putrefactive type, the gastric juice exhibiting decided germicidal properties. Then, too, the presence of air acts against their development. Much of the so-called gastric fermentation does not occur in the stomach but rather in the duodenum.

Bacterial Action in the Intestines. — In the lower part of the small and in the large intestines, the bacteria of the anaërobic type increase, conditions more favorable to their development existing there than farther up in the intestinal tract. However, there are a great many bacteria in the whole of the small intestine. Those producing decomposition of the unabsorbed proteins are especially prominent in the colon.

Herter [8] states that "the presence in the colon of

[7] "Chemistry of Food and Nutrition," by Sherman.
[8] Herter's "Bacterial Infections of the Digestive Tract" (1907).

immense numbers of obligate micro-organisms of the B. coli type may be an important defense of the organism in the sense that they hinder the development of that putrefactive decomposition which, if prolonged, is so injurious to the organism as a whole. We have in this adaptation the most rational explanation of the meaning of the myriads of colon bacilli that inhabit the large intestine. This view is not inconsistent with the conception that under some conditions the colon bacilli multiply to such an extent as to prove harmful through the part they take in promoting fermentation and putrefaction."

Effect of Bacterial Activity in the Body. — In summarizing the effects of bacterial action in the body it is found that with the exception of oxalic acid, which is exceedingly injurious, and which, according to Herter, results from the eating of large quantities of meat and sugar, the products of fermentation are simply irritating in character, while those resulting from putrefaction are distinctly toxic. Among the substances deserving mention under this head we have indol, skatol, cresol, and phenol. These substances are very soluble and upon absorption combine with the sulphuric acid formed in the body and are excreted by way of the kidneys where they appear in the urine as "conjugated sulphates," the chief of which is indican. The amount of indican in the urine is taken as a measure of the intensity of the putrefaction taking place in the body.

Metabolism.—Under the term metabolism is included the series of processes through which the foodstuffs are carried (*a*) in the conservation of the tissues of the body and (*b*) in the maintenance of body temperature and physical work (Taylor). The processes concerned in metabolism are chiefly those of building up, "anabolism," and breaking down, "catabolism." In the processes of anabolism the products absorbed are built into the tissues and cells of the body. In catabolism, the worn particles from the cells,

and the dead cells no longer useful are broken up and thrown out of the body. According to Taylor, "side by side with these processes are the reactions of combustion, whereby the temperature necessary for the life of the cells is maintained, and the energy needed for external work furnished."

Behavior of Carbohydrates in Metabolism. — As Sherman [9] has said: "At least two kinds of enzymes are believed to be involved in the combustion of glucose in the tissue cells, (1) cleavage enzymes, which split the molecule into fragments more easily oxidized, and (2) oxidizing enzymes or oxidases which stimulate the oxidation of the cleavage products. Both kinds of enzymes are widely distributed through the body and are believed to be normal constituents of all active cells."

Production of Energy. — It has been proved that the energy for external and internal work is produced largely from the glucose brought by the blood and oxidized in the muscles.

When a surplus amount of carbohydrate food is eaten, over and above the immediate needs of the body for fuel, it is stored in the liver and muscles as glycogen, which can be readily reconverted into glucose. When the supply of carbohydrate food is greatly in excess of the body's needs, that is when the liver and muscles cease to store glycogen, it is built up into adipose tissue and furnishes a readily available source of emergency fuel.

Fate of the Carbohydrates. — After their oxidation the end products of carbohydrates, that is, the substances which are no longer available for use in the body, leave it in the form of carbon dioxide and water by way of the kidneys (urine), the skin, the lungs, and the intestines.

Fate of the Fats. — The fats upon absorption are taken

[9] "Chemistry of Food and Nutrition," by Sherman.

up by the lymph vessels instead of the capillaries and enter the blood with the lymph. According to various investigators, the fat which causes the turbidity of the blood plasma at the height of absorption will, as a rule, disappear after a few hours, part of it being burned as fuel, producing energy for the internal and external work of the body, and at least a part of the fats eaten being rebuilt into body fat. The end-products of fat metabolism, like those of the carbohydrates, consist of carbon dioxide and water, and leave the body by the same excretory channels.

When the normal oxidation of the fatty acids is interfered with or is overtaxed, a different reaction from that which usually occurs may take place, and this results in an excretion of acetone in the urine (see Chapter on Diabetes).

Protein metabolism is certainly more complex than that of either of the other active organic food groups. The amino acids which are the products of protein digestion are taken up by the capillary blood vessels in the intestinal walls and are passed by them into the portal vein, soon to become available for the needs of the body.

Fate of the Proteins. — After utilization in the body, the proteins, like the other foods, leave certain waste products which indicate to a greater or lesser extent the completeness with which the organism has made use of the food materials. The end-products of protein metabolism are: **urea, ammonium salts, purin bodies,** and **creatinin.** These products leave the body chiefly in the urine. The chief end-product in man is urea. This substance represents from 82-88% of the total nitrogen excreted by the kidneys. However, the less highly oxidized products represent the incomplete products of protein metabolism and thus indicate the changes through which these products must pass before being changed into urea. If for any reason there is

an impairment of the liver through which they must pass and where the change into urea is accomplished, there will be a rise of ammonia and a corresponding decrease in the output of urea in the urine. Thus, ammonia is formed at the expense of the urea. This occurs in fevers, diabetes, and certain structural diseases of the liver. According to Sherman:[10] "Normally about 2 to 6 per cent of the total nitrogen eliminated is in the form of ammonium salts, the amount depending largely upon the relation between the acid-forming and base-forming elements in the food."

Acid-forming and Base-forming Foods.—Mendel[11] states: "There are foods which act as potention acids and others which function as bases in the organism. When burned up either in the laboratory or in the body cells, they have a preponderance of acid or base, as the case may be, in their ash. In this respect potatoes, apples, raisins, and cantaloupes, for example, are base-forming foods which depress the output of ammonia and increase the solubility of uric acid in the urine, whereas meat, cereals, and prunes (the latter with their content of benzoic acid) furnish acids in predominance.

Purin Bases.—These compounds are formed in the body as cleavage products of nucleoproteins or taken into the body in food. The chief of these products are **adenin, guanin, hypoxanthin, xanthin,** and **uric acid.** The latter is the most highly oxidized of all the purin bases and is the form in which they are chiefly eliminated in the urine.

Formation of Uric Acid.—The formation of uric acid can in a measure be controlled by attention to the diet, eliminating those foods known to be purin bearing. Normally from 1 to 3 per cent of the nitrogen eliminated will be in the form of uric acid. The normal human being

[10] "Chemistry of Food and Nutrition," by Sherman.
[11] "New Points of View Regarding the Part Played by Different Foodstuffs in Nutrition," by Lafayette Mendel, Ph.D. Read at the Sixty-fifth Annual Meeting of the American Medical Association, June, 1914.

oxidizes about half of the purins eaten and excretes about half, mainly in the form of uric acid. According to Mendel, the formation of uric acid takes place throughout the body, and its partial destruction is accomplished by the kidneys, muscles, and liver. The formation of purins in the body and their elimination in the form of uric acid is especially significant in certain pathological conditions, gout, for example, in which the body has difficulty in eliminating these compounds.

The purin bodies are both endogenous and exogenous — that is, they may be brought into the body in food as such, or they may be formed as a result of the metabolism of the body tissues. For this reason the damage wrought by these substances may to a certain extent be controlled by eliminating the purin-bearing foods from the diet. Flesh-foods are high in purins, especially the highly nucleated glandular organs, liver, thymus (sweetbreads), etc., kidney, beef, mutton, veal, pork, chicken, turkey, goose, sardines, anchovies, all kinds of fish except cod. Among the vegetable foods asparagus, beans, peas, and spinach are highest in purins. Boiling extracts much of the purins from food. Meat especially should be prepared by this method, if used in the diet of individuals suffering from gout. Eggs and milk are purin free, and may be used freely. Certain substances increase the difficulty of eliminating uric acid. Alcoholic beverages for example are especially deleterious.

Creatinin. — This end-product of protein metabolism is, like uric acid, endogenous and exogenous. It is one of the normal constituents of the urine. The quantity is fairly constant for the individual, averaging about 0.02 gram per kilogram of body weight per day.

Mineral Metabolism. — A study of the organic foodstuffs reveals the fact that many of the mineral salts concerned in nutrition enter the body in organic combination with those constituents. Certain of the mineral salts, how-

ever, enter, exist in and leave the body in the same organic form in which they occur in the food materials. This is true of chlorine, which for the most part, functions in and leaves the body in the form of chlorides (chiefly sodium chloride). A small part of the chlorine is used in the production of the hydrochloric acid of the gastric juice.

Sulphur and iron, both enter the body as essential constituents of proteins, and their metabolism occurs with that of these foodstuffs; the sulphur being converted largely into sulphuric acid must be neutralized at once, and it leaves the body by way of the urine as inorganic sulphates. Part of the sulphates are excreted as ethereal (conjugated) sulphates; the amount excreted in this form depending largely upon the extent of purification in the intestinal tract.[12]

Phosphorus. — This mineral salt is found to be present as an essential constituent of certain proteins, fats and carbohydrates. It also enters the body in the form of inorganic phosphates. During the digestion and metabolism of the organic foodstuffs the phosphoric acid radical is split off and eventually nearly all of the phosphorus leaves the body in inorganic form (inorganic phosphates).

Calcium. — Being the chief constituent of the bones, large quantities of calcium salts are stored in the skeleton of the child both before and after birth. The functions of calcium have already been discussed. That part not stored, which has finished its work in the body is excreted through the intestinal wall and leaves the body by way of the feces, only a small part of the calcium concerned in metabolism being excreted in the urine.

The Process of Osmosis in the Body. — The influence exerted upon the process of osmosis in the body is one of the most important parts played by the mineral salts in

[12] See "Bacterial Action in the Body," p. 181.

metabolism. The fact that these chemical substances are indispensable to the metabolic processes makes it necessary for the nurse to know where they can be found in food and how best to use them.

Metabolism of Body Tissues. — The constant breaking down and building up of the tissues of the body and the evolution of heat as a by-product of the energy expended may be summed up in the term "metabolism." The metabolism of the body is normally supported by the food ingested. However, it is a known fact that were no food eaten the processes would continue just the same, the difference only being the use of the body structure instead of food materials. According to Sherman, the chemical changes and energy transformations are of course inseparable. It has become customary to speak of the metabolism of matter and the metabolism of energy, and to regard the extent of the metabolism of any material substance as measured by the amount of its end products eliminated, and the extent of the energy metabolism as measured by the amount of heat or of heat and external muscular work which the body gives off.

SECTION IV

DIETO-THERAPY

CHAPTER VIII

PREGNANCY AND LACTATION

THERE are many traditions in regard to the food requirements of the prospective mother. Many of these have been proved fallacies. As a matter of fact both the woman and the developing child are likely to suffer if the diet is insufficient or badly balanced.

Factors Affecting Diet During Pregnancy.—In formulating a dietary for the pregnant woman, then, not only must the needs of the child be considered but those of the mother also, since the developing embryo draws from the body of the woman materials necessary for its growth, and if these needs are not covered by an increase in the diet, her body and that of the child also will show evidences of lack of nourishment.

Phosphorus and Calcium Requirements.—If, for example, the mother's diet is lacking in those materials which produce growth, or is deficient in those mineral salts, such as those of phosphorus and calcium, which are requisite and necessary for the growth of bones in the infant, the mother's bones and teeth will show this loss and in all probability the baby will sooner or later also show a like deficiency. However, it must be remembered that the pregnant woman is under a strain, both physical and mental. She must not be encouraged to eat beyond her needs or the digestion will be disturbed.

Nutritional Disturbances in Early Months.—The nutritional disturbance manifested by nausea and vomiting in the morning is due, not to the stomach or any disturbance therein, but to the fact that a mild form of poisoning

occurs, resulting from the substances produced through the formation of the placenta reaching the general circulation on account of the incomplete establishment of the connection between the embryo and the mother. As soon as this connection is complete and fetal circulation is established this "morning sickness" disappears.

Food Requirements of Prospective Mother. — The food requirements of the prospective mother are not materially affected during the first four months of gestation, and even after this, when the infant is developing rapidly, and up to the date of its birth, the mother's requirements are only increased about 20 per cent. The amount of food necessary to cover the body needs, for maintenance and energy of a woman living a sedentary or moderately active life, plus 20 per cent for building materials for the growing child, will be adequate for the pregnant woman. Thus, if her needs are ordinarily from 2,000 to 2,400 calories per day, after the fourth month they will probably be increased 2,400 or 2,800 calories a day and will rarely ever be more than 3,000 calories a day.

Dietetic Treatment of Normal Pregnancy.—The peculiar conditions surrounding the woman at this particular time must be taken into consideration in arranging her diet. The building foods which are necessary for the developing child must be given in the simplest form, milk and eggs being used liberally and meat sparingly to obviate any unnecessary tax being placed upon the kidneys. The use of fruit and green vegetables to supplement the milk and eggs is urged. It has been found advisable at such times to give small meals frequently rather than the regular meal three times a day. The feeling of "fullness" which often occurs during the last two or three months of gestation makes it more comfortable for the pregnant woman to eat less at a time and oftener. If, for example, she be given a glass of rich milk or a nutrient beverage, either of

enforced malted milk, albumenized orange juice, buttermilk, zoolak, or koumiss, at about eleven o'clock in the morning and again about four o'clock in the afternoon, she will have taken sufficient nourishment to meet the new requirements without taxing her digestion or imposing extra work upon the kidneys.

Prenatal Tooth Development.—An important duty on the part of the expectant mother is to see that the development of the teeth of the unborn infant is assured, this comes with a care on her part, as to the calcium and phosphorus content of her diet, and an adequate vitamin allowance, especially D and A vitamins.

The first set of teeth begin to develop before the eighth week of prenatal life, since they can be readily distinguished by the eighth week of prenatal life. According to McCollum "by the fifteenth week the enamel organs have appeared and calcification begins on the tips of the incisors, about the twentieth week. The six year molars, the first of the permanent teeth to be erupted, are beginning to calcify about the time the child is born."

Thus it is clearly demonstrated that the diet and habits of the mother must be carefully adjusted during the entire period of pregnancy since a lack of calcium and phosphorus, a deficiency in the D vitamin content of her diet as well as too little sunshine and fresh air will undoubtedly result in poor tooth development not only of the first set of teeth in the infant, but the permanent teeth as well.

Park has written, "Personally I believe that if pregnant women receive ample well balanced diets, in which green vegetables were abundantly supplied and cow's milk was regularly taken, and kept a sufficient part of their time in the open air and sun, and if their infants were placed in the direct rays of the sun for a part of each day and were fed codliver oil for two or three years of life, more could be

accomplished in regard to the eradication of caries of the teeth than in all other ways put together."

Factors Influencing Tooth Development.—The effect of diet has already been mentioned, various scientists have estimated the calcium and phosphorus intake during pregnancy to greatly exceed that of non-pregnant women; that the average intake of .67 grams of calcium and 1.32 grams of phosphorus to be insufficient to meet the needs of the developing infant, that an amount approximating a fifty per cent increase would be much safer for both the expectant mother and the developing child.

Abnormal Symptoms.—The chief point to keep in mind is any abnormal symptom which may develop. The chief of these is albumen in the urine. The urine must be examined frequently and measures taken immediately to overcome albuminuria should it occur. It is wise, as has already been stated, to restrict the meat in the diet, and in cases where albumen is found in the urine even when the meats are restricted, it may be necessary to place the patient upon a milk diet for a time until the urine clears up.

The detrimental effect of infectious diseases, especially of scarlet fever, measles, and syphilis, in the mother upon the development of the unborn child, has likewise been brought to light by research studies where special attention was given to the factors influencing the health of the dental organs.

Supplementary Feeding.—Cereals, especially the whole cereals, must be used liberally. Gruels made with milk are often found valuable additions to the dietary. The prospective mother must be urged to take a regular amount of gentle exercise, not to become overtired, or excited, to eat sparingly at night, and to drink plenty of water. She must avoid becoming constipated by eating plenty of green vegetables and fruit.

Sample Diet Sheets.—The following dietary is suggested:

Breakfast should consist of thoroughly cooked cereals, wheatena, cream of wheat, malt breakfast food, cracked wheat, rolled or cracked oats, served with cream or sugar or both, whole wheat bread, muffins, or biscuits, with butter, raw or stewed fruit, coffee, tea or cocoa with milk. Luncheon may consist of milk or vegetable soups, eggs in any form, boiled potatoes, sweet potatoes, string beans, greens, or any green vegetables, simple desserts such as custards, rice or tapioca puddings, bread pudding, etc., milk, tea, cocoa, buttermilk, zoolak or koumiss as beverages. For dinner, if albuminuria is not present, a small piece of meat may be taken, together with green vegetables, rice, potatoes, simple salads, and a simple dessert, milk or coffee supplemented with milk.

Selection of Food.—The following foods may be used to formulate the diet sheet: Wheat, oats, or corn cereals, rice, tapioca, made into simple puddings or served as breakfast foods; fruits, oranges, prunes, apples, raisins, dates, figs, or grapefruit, stewed or raw. The fruit juices may be used instead of the whole fruit if the latter disagrees. Vegetables: peas (green or dried), beans (string beans or dried beans), spinach, greens (turnip, mustard, or beet), cabbage, onions, celery, lettuce, served as vegetables or in soups, potatoes. Meat: lightly broiled beefsteak or stewed or boiled meat or chicken served not more than once a day or three times a week. Eggs, prepared in different ways. Cheese dishes. Breakfast bacon or ham in moderate quantities, butter, olive oil (or other salad oils) in moderation, whole wheat, graham or bran bread, Boston brown bread and crackers, milk, cocoa, chocolate, buttermilk, malted milk, koumiss, or zoolak; coffee and tea in moderation.

The diet, as has already been stated, may be supplemented by nutrient beverages or milk gruels.

DIET IN LACTATION

The diet of the nursing mother, as has been explained in a previous chapter, must not only cover her own requirements but must likewise be adequate to furnish the extra requirements imposed by the nursing infant.

Food Requirements of Nursing Infant.—When the baby is a month old he should be growing rapidly, and his food requirements at this period and until he is about three months old will be approximately fifty calories per pound of body weight in the twenty-four hours. As he grows older his requirements grow gradually less in proportion to his weight. This is because the rate of growth is less, so that for the next three months the requirements are from 43 to 40 calories per pound of body weight per day, and 35 calories per pound during the last three months, or by the end of the first year of life.

It has been estimated, as before stated, that the average infant will take 2⅓ to 2½ ounces of mother's milk per day [1] to each pound of body weight and that every ounce of mother's milk will yield on an average 20 calories. Hence a month-old baby weighing ten pounds will be taking about 23 ounces a day, yielding 460 calories. Scientists have estimated that for every calorie produced by the milk two extra calories must be provided by food, so that for the baby requiring 460 calories per day, to cover his requirements the mother will be obliged to consume extra food to yield 920 calories, or the regular amount to meet her normal requirements plus the extra food to make sufficient food for the baby.

Diet of Nursing Mother.—The diet of the nursing mother need not be different from that to which she is accustomed. She should be warned against overwork or over-fatigue, nervous excitement and worry, since these

[1] "Feeding the Family," p. 93, by Mary Swartz Rose.

factors affect the digestion of the nursing baby. She must be careful not to eat indigestible foods or foods which disagree with her, as such things will undoubtedly affect the digestion of the infant. When an article of food does cause digestional disturbances in the baby, it should be carefully omitted from the mother's diet.

Factors Retarding and Stimulating Milk Secretion.—Constipation in the mother reacts quickly and unfavorably upon the secretion of milk. The same has proved to be the case when she becomes excited, nervous, worried, or overtired.

The average diet for the normal woman is safe for the nursing mother. If her supply of milk is deficient, it may be at times increased or stimulated by the drinking of a glass of milk between meals or by taking a cup of hot cereal milk gruel. It was formerly believed that beer, ale, or stout acted directly upon the mammary glands, stimulating the secretion of milk, but there is little proof of this and the drinking of alcoholic beverages need not be encouraged on this account, since often more nourishing beverages fulfill the purpose more efficiently and without bad results.

SUMMARY

Gastric Disturbances.—The nausea and vomiting so of ten a part of early pregnancy is not believed to be the result of a disordered stomach but primarily a mild form of poisoning resulting from the incomplete establishment of the fetal circulation.

Adjusting the Diet.—The adjustment of the diet to cover the needs of the prospective mother and those of the developing child is essential. The amount of food taken by the mother is not materially changed during the first three months of gestation. An average normal diet is all

that is necessary. After this time a twenty per cent. increase in the woman's diet will furnish adequate means both for her maintenance and for the growth and development of the child.

Type of Food.—The kind of food which is necessary for the pregnant woman to take during this period is very similar to that taken ordinarily. It is necessary to furnish food materials rich in calcium and phosphorus, with an adequate supply of proteins in their simplest form in order to meet the requirement of the growing organism. Milk and eggs furnish the most efficient foods in this respect and the prospective mother should see that they form the chief items of her daily dietary. Milk furnishes calcium in its most available form for the developing skeleton of the growing infant, hence it is necessary to provide the mother with food to replace the mineral which is withdrawn from her body.

Meat in the Diet.—Meat should be eaten sparingly by the prospective mother, as it imposes needless work upon the already taxed kidneys and, if eaten in excess, will give rise to dangerous complications. Milk and eggs will provide ample protein for all purposes.

Albumen in the Urine.—Albuminuria is one of the most frequent complications in pregnant women. It should be combated and controlled as soon as possible. The allowance of meat should be cut down or entirely eliminated from the diet until the urine clears up. When albuminuria is persistent in spite of efforts to overcome it, the patient must be placed upon a strict milk diet as used in acute nephritis, to prevent dangerous complications arising.

LACTATION

Diet of Mother.—Her dietary need not differ materially from that to which she is accustomed. She must avoid indigestible foods or any article which has been proved to disagree with either the infant or herself.

Factors Regarding Secretion of Milk.—Constipation, worry, nervous excitement, and over-fatigue all have an unfavorable effect upon the secretion of milk and must therefore be avoided by the nursing mother.

The Bowels.—Constipation of the mother reacts quickly and unfavorably upon the health and comfort of the baby, hence it should be avoided by eating coarse breads, green vegetables, and fruits, when they do not disagree with the baby, by drinking plenty of water and taking a certain amount of outdoor exercise to keep her own health in good condition.

Stimulating the Milk Production.—When the milk supply is deficient it will be advisable for the mother to drink a glass of milk or a bowl of cereal milk gruel between meals. Alcoholic beverages are not necessary to insure an adequate secretion of milk. The milk or milk gruels answer the purpose more efficiently and without bad results.

Energy Requirements of Infant.—The average baby requires fifty calories per day per pound of body weight to cover his energy growth and development needs for the first three months of life, after which the rate of growth is less and his requirements decrease from forty-three to forty, then to thirty-five calories per day per pound by the end of his first year.

Amount of Milk Needed for Infant.—Approximately two and one-third ounces to each pound of body weight per day covers the needs of the average baby.

Fuel Value of Mother's Milk.—Each ounce of milk yields twenty calories.

The Making of Milk.—It has been estimated that for every calorie yielded by milk, two extra calories must be provided by food.

PROBLEMS

(*a*) Formulate a dietary for a pregnant woman, allowing for a twenty per cent increase over her normal requirements.

(*b*) Show how the diet may be made to cover the need for additional iron, calcium and phosphorus.

(*c*) Formulate a diet for a nursing mother with an infant two months old and weighing twelve pounds.

CHAPTER IX

INFANT FEEDING

In taking up this part of our study on nutrition, there are several points to be kept in mind by the nurse: (1) that it will be difficult, if not impossible, to understand the metabolic changes taking place in abnormal conditions unless those occurring in the normal human body are understood; (2) that certain diseases are due directly to errors in diet; (3) that in other diseases, diet plays the chief part both in the bringing about and in the relieving of the conditions; (4) whereas there are certain other diseases not affected by diet, save in so far as well or poorly selected and prepared food always affects the individual, whether normal or abnormal, and that in the latter conditions the organism is more susceptible to bad influences.

This being the case it behooves the nurse to examine herself to find whether or not she understands the fundamental principles underlying the nutrition of the human body, that she may efficiently deal with the changes which occur more or less when the body is attacked by disease.

We include normal infant feeding in this section, because in no other age is it quite so necessary for care to be observed in formulating and carrying out a diet. Errors during this period may only appear to exert a local influence, causing disturbance which may readily be relieved, but the danger is in laying too little stress upon these disturbances, forgetting that the delicate organism of a child may be permanently injured by a constant disregard of nature's mandates. In the words of the old adage, the pitcher may go once too often to the well, and an injured digestive apparatus is even more difficult to mend than the proverbial pitcher.

In this section, then, the metabolic changes due to pathological conditions and the dietetic treatment thereof will be discussed.

Age and Weight. — As has already been stated, there are certain points to be kept in mind in attempting to provide an adequate diet for the human machine; *First,* the *age* and *weight.* The gain during infancy should be steady — an allowance of 40 calories per pound of body weight to cover the energy requirements and 4 protein calories per pound to cover the nitrogen needs. During the second and third years the energy requirements will be covered by 30 to 40 calories per pound and the nitrogen needs by 3 to 4 protein calories per pound. From the fifth to the eighth year the nitrogen needs continue to be covered by 3 to 4 protein calories per pound and the energy requirements by 35 to 37 calories per pound during the fifth year; 32 to 34 calories per pound during the seventh year. After the body has reached its full development its requirements will be met if sufficient protein is provided to cover its maintenance needs and if the energy calories are regulated according to the amount of exercise taken, keeping in mind that the energy requirements of a man at rest (sitting) will be about 2,000 calories per day and that exercise, especially that taken in the open air, raises the energy needs of the body.

Daily Gain. — In estimating the relative daily gain in body weight of children of different ages, Mendel [1] gives the following table:

TABLE

In the first month, about	1.00 per cent
At the middle of the first year	0.30 per cent
At the end of the first year	0.15 per cent
At fifth year	0.03 per cent
Maximum in later years for boys	0.07 per cent
Maximum in later years for girls	0.04 per cent

[1] "Childhood and Growth," p. 18, by Lafayette Mendel.

Retention of Nitrogen in Infancy. — When the baby is gaining in weight and strength there is a retention of both nitrogen and salts, and when the baby is not gaining there may be a loss of both of these bodies; when one is retained in the body the other is apt to be retained.[2]

NORMAL INFANT FEEDING

Much has been written in the past few years on the care and feeding of infants and children. This is well, since statistics show an alarming increase in the rate of infant mortality during the early years of life, and anything which can be done to check this lamentable and often avoidable waste of valuable life should be resorted to with care and attention.

Food for Infants. — The natural food of all young mammals is the milk of their own mother. The rate of growth and development differs in every species; the calf, for example, doubles birth weight much more quickly than does the baby of the same age. However, the milk of the cow, which meets the needs of the calf perfectly, falls short of meeting the requirements of the infant, whose rate of growth is not nearly so rapid. For this reason if for no other, it would be advisable to give the baby its natural food rather than to attempt a substitute which is, at best, a poor one.

Weight. — The average infant weighs from six to seven pounds at birth. This weight should be doubled in the first five or six months of life and tripled by the end of the first year. The most important business, then, in the life of the child during the early years is growth and development. To achieve this properly the baby's habits must be adjusted to his needs.

Regularity in Feeding. — He must have the proper food and enough of it, and have it given at regular intervals,

[2] "Diseases of Nutrition and Infant Feeding," by Morse and Talbot.

"by the clock," for guesswork is fatal in infant feeding. He must be given water between meals. Babies often cry from thirst when they are thought to be doing so from hunger or temper, or both. The healthy baby sleeps about twenty-two hours out of twenty-four during the early months, and even during the latter six months of the first year more time is spent in sleeping than in waking.

The Bowels. — The bowels should move several times a day, the stools being smooth and of a yellowish color, of the consistency of pea soup. After the first month, twice a day is about the normal number of stools for the healthy baby. The infant should be placed upon a vessel held in the lap of the nurse at regular times, preferably right before the morning bath, and in the evening. In this way regularity in evacuating the bowels is obtained, and a habit formed which will prove valuable through life.

The Bath. — The daily bath is likewise necessary for the health and comfort of all babies; so, too, are fresh air and sunshine.

As has already been stated, breast milk is much better for babies than cow's milk or any artificial food. There is something in the mother's milk which gives strength and resistance to the baby which is absolutely lacking in any other food no matter how carefully it is selected and prepared, and for this reason young mothers must be prevailed upon to nurse their babies whenever it is possible for them to do so. When circumstances, such as having to be away all day at work, make it impossible for a mother to nurse her baby at regular intervals, she can be taught how necessary are two or three breast feedings a day to the future welfare of her child. When social reasons or lack of desire on the part of the mother make her unwilling to nurse her baby, it is the part of the nurse to lay the case before her and let her judge whether or not she is willing to accept the responsibility of bringing into the world a

life for which she is unwilling to provide weapons with which to fight the good fight.

Habits of Mother. — The mother must be taught how to efficiently nurse her baby; she must keep in mind that upon her good health and temperate habits depend the health and comfort of her baby. It devolves upon her to provide food efficient in quality and quantity. To do this, her own diet must be simple and wholesome. The nursing mother must remember that she has to provide, not only for her own maintenance and energy requirements, but also for the infant whose fuel requirements are ever demanding more food to provide for its rapid growth.

Food and Its Relation to Milk. — It is believed that two calories of food extra are necessary to produce one calorie of milk, and since a month-old baby requires 2⅓ ounces of mother's milk to every pound of his body weight, and one ounce of mother's milk will yield 20 calories, it is clearly seen that the mother will have to increase her diet to cover the requirements of the baby. For example, if the baby weighed 12 pounds, he would require 28 ounces of milk in 24 hours, or 560 calories. Thus if it requires two calories of extra food to make one calorie of milk, the mother's diet would have to provide 1,120 calories extra, or about as much food as would fulfill the needs of a laboring man, 3,000 to 3,500 calories, even if she were doing practically no actual work; while if she were actively employed and doing a certain amount of physical labor, her rations would have to approximate those of a man doing heavy muscular work (about 3,500 to 4,000 calories per day).[3]

Breast Milk versus Cow's Milk. — Consensus of opinion shows that breast-fed infants require less energy than the ones who must be nourished artificially. This is probably due largely to the fact that the constituents of human milk are in a more available form than those in cow's milk, the

[3] "Feeding the Family," by Mary Swartz Rose.

former requiring a lesser expenditure of energy on the part of the organism to become available than the latter. Very active babies, ones who kick and throw themselves about or cry violently, have a greater energy requirement than the more placid baby who sleeps more and is more quiet in movement and who cries less when awake. Breast-fed babies are generally more quiet than their less fortunate artificially fed brothers. It has been demonstrated that the artificially fed baby has a much harder fight for existence than the baby who receives his natural food; hence the necessity of using every available means to make the food digestible, and to lessen the danger arising from the additional work put upon the entire apparatus. Cow's milk contains practically the same chemical elements as are found in human milk, but these elements are combined in a slightly different manner, and are not so easily handled by the immature organs. The proteins of milk consist of casein, which is insoluble, and albumen, which is soluble. According to Van Slyke the proportion of insoluble to soluble protein in cow's milk is 3.6:1, while in human milk the proportion is only 1:1. The ash constituents in cow's milk are in excess of the needs of the infant organism, but since a great part of these salts is in an inorganic form they are not retained to the same extent as those contained in human milk, which are in an organic form.

Rules and Regulations. — It is not possible to lay down hard and fast laws to cover the subject of infant feeding. The food must be adapted to the individual needs of the baby in question. The nurse must see that the milk is obtained from a responsible dealer, certified milk being of course the safest. The bottles of milk should be wiped off carefully and placed directly on the ice as soon as they are received. The milk generally used in infant feeding has a fat content of 4%. That having a higher percentage of fat is technically cream. The following table showing the

fat, sugar, and protein composition of whole milk, cream, skimmed milk, and whey was arranged by Morse and Talbot: [4]

TABLE

	Fat	*Milk Sugar*	*Protein*
Whole milk	4.00	4.50	3.50
7% cream	7.00	4.45	3.40
10% cream	10.00	4.40	2.25
16% cream	16.00	4.20	3.05
32% cream	32.00	3.40	2.50
Skimmed milk	1.00	5.00	3.55
Separated milk (fat free)	0.25	5.00	3.65
Whey	0.25	5.00	0.90

Seven per cent (7%) cream is obtained from the upper 16 ounces of a quart bottle of milk which has been allowed to stand undisturbed for six hours. The upper third of the bottle contains 10% fat, while the whole fat layer from the quart bottle, regardless of the number of ounces, contains about 16% of fat.

Methods of Artificial Feeding. — The use of whole milk, top milk, or skimmed milk, diluted with water, and either milk sugar, malt sugar, or sucrose (cane sugar) added, is the method of feeding most commonly used, and upon it are based the formulas universally advised by infant specialists. There are cases in which simple dilution is not advisable. In premature or very young infants, for example, the whey mixtures have been found to give the best results. In toxic diarrheas, where the putrefactive bacteria make the use of all but the minimum amount of protein inadvisable, the above method is contraindicated, as it is likewise in cases where vomiting of casein curd is a prominent feature.[5]

The Use of Alkalies. — There are many cases in which

[4] "Diseases of Nutrition and Infant Feeding," p. 218, by Morse and Talbot.

[5] "Generally Accepted Methods for Artificial Feeding of Infants with Indicatives and Contra-Indicatives," by Orville R. Chadwell, M.D. Reprinted from "New England Medical Gazette," June, 1916.

the physician deems it advisable to add an alkali to the milk mixture. The one generally selected is limewater. However, sodium citrate and sodium bicarbonate are also used. The reasons for adding alkalies to the milk mixtures are: (1) to check the coagulation of the casein, (2) to hasten the emptying of the stomach, or (3) to chemically change the formation of the curd. In certain cases it is only necessary to delay the coagulation of the casein in the stomach, in which case a certain amount of limewater is used. Its action is to swell the protein of the milk and in this way effect the precipitation of the casein. In other cases it is found advisable to prevent the formation of curd and hasten its departure from the stomach. Cannon[6] claims that milk before it coagulates leaves the stomach quickly like water in gushes. Hence, if an alkali like limewater, bicarbonate or citrate of soda is added to the milk this coagulation will be checked and the digestion be facilitated.

Amount and Type of Alkali Used. — The amount of alkali[7] necessary to bring about any change in the general effect of the formula must be determined by the amount of milk and cream in the mixture, since these constituents alone determine the acid content. However, it is impossible to judge exactly the amount of alkali to add, but an approximate estimate is made from the work done by the various investigators. It has been estimated that from 25 to 50 per cent of limewater must be added to milk to change it to any marked degree. In using bicarbonate of soda, a much less quantity brings about the desired result, 1½ grains of bicarbonate of soda being equal to one ounce of limewater. The action of these two alkalies is different. The soda acting upon the milk causes the curds to be more porous, and therefore more easily acted upon in digestion.

[6] "Mechanical Factors of Digestion," by Cannon.

[7] "Diseases of Nutrition and Infant Feeding," p. 204, by Morse and Talbot.

Sodium citrate likewise tends to prevent the formation of tough curds. It is added in amounts of 1 to 2 grains to each ounce of milk or cream in the mixture whenever it is found necessary to use it at all.

The addition of any alkali to the formula is resorted to if the symptoms indicate the need for it, but the type and quantity is entirely within the province of the physician, not the nurse.

The Addition of Sugar. — **Lactose** is the form in which the carbohydrates are found in milk, and it has been a general rule to employ this sugar in making up the sugar content of a formula, using from 6 to 7 per cent of the mixture in this form to cover the necessary energy requirements of the infant. Other sugars are used, however; and of late years malt sugar has been widely employed for this purpose. The form now generally accepted is known as **dextrimaltose,** which is a combination of dextrin and maltose, both of which are readily acted upon by the sugar-splitting enzymes of the digestive juices. In digestion, lactose or milk sugar is split to dextrose and galactose and utilized in the body, both as a source of energy and as a food for the lactic acid bacteria which are active in the small intestine.

Malted Foods. — The addition of malted foods or malt sugar to the food of infants tends to bring about a more rapid gain, both in energy and in body weight, than is generally the case where other sugars are used. This sugar is used as a substitute for milk sugar in many formulas, especially in those cases in which the casein of cow's milk needs to be made more digestible in form. Malt sugar is indicated in the following conditions: [8] (1) in severe atrophies, (2) in cases of fat indigestion before the atrophic stage is reached, (3) in cases where there is slight curd indigestion, indicated

[8] "New England Medical Gazette," June, 1916. Reprint by Orville Chadwell.

by some vomiting and slow gain in weight, (4) in cases where excessive intestinal fermentation is manifested by gas and colic.

Malt sugar (dextri-maltose) is contraindicated to a slight degree in cases " of simple acute diarrhea where lactose, by supplying fermentative media, more easily restores the normal bacterial balance."

Diluents. — Barley and oatmeal water are used as diluents to the amount of one-fourth or more of the mixture. Oatmeal water or jelly is used more during the winter months than in the hot summer months. As the fat content of the oatmeal gives it a more laxative effect, it is undesirable to use it at the season in which the summer diarrheas are prevalent. Barley water has something of a colloidal action upon the casein, causing the curds to be finer and less tough in character. Both barley and oatmeal water are used in place of plain water for babies when this colloidal effect upon the curd of the milk is desired, also where the weight of the infant shows a disposition to remain stationary, especially where there are no other symptoms to account for the lack of gain.

Whey is used with babies who cannot digest the insoluble protein of cow's milk. This is often the case in premature babies and is manifested by a persistent vomiting of curd. The energy requirements are obtained by the addition of cream and lactose to the whey.

Buttermilk Mixtures and " Eiweissmilch." — It is often found desirable to use some other form of milk than whole, top, or even skimmed milk, and for this purpose lactic acid, milk and the albumen or " Eiweissmilch " are substituted. In the buttermilk mixtures the precipitation of the casein is brought about by lactic acid bacilli (Bulgarian culture). This prevents the coagulation of the casein into tough curds. Lactose buttermilk or lactic acid milk is used in the feeding of infants who have persistent green stools, and in cases of

acute toxic diarrhea brought about through the action of gas bacillus.

Buttermilk is more difficult to administer to babies than formulas made from plain milk by reason of its flavor. However, the results are remarkable in the above-mentioned conditions.

"Eiweissmilch" is used in atrophic cases where there are bad green stools.

"Homogenized Milk." — Dr. Ladd of the Children's Hospital in Boston has presented many cases of infants who showed an intolerance for butter fat. These cases he has treated with formulas containing a foreign fat, usually olive oil. This milk is subjected to a treatment which brings about a more complete emulsification of the fat than is possible in cow's milk, causing it to resemble in character the quality of the mother's milk. Homogenized milk has been used with success in cases where it was impossible to supply the infant with breast milk.

The process is accomplished by the use of an apparatus known as an "homogenizer"[9]; in this machine the fat globule is crushed and so finely divided as to prevent its re-formation. The greatest drawback to the use of this process lies in the scarcity of available machines. Cod liver oil is now used in many cases where the infant shows a failure to gain or is in possible danger of developing rickets, with the homogenizer it is possible to add the oil to the formula, thus facilitating its use.

Technique of Milk Modification. — The absolute necessity for cleanliness has already been dwelt upon in respect to milk, and in infant feeding the vigilance which must be observed in the preparation of the food cannot be too strongly emphasized. The milk itself must be of known purity. Where there is any uncertainty about its source, it

[9] The best substitute for the homogenizer is found in an electric mixer; a formula prepared with a fat other than cream can be made by means of this mixer to approximate very closely that of homogenized milk.

must be sterilized or pasteurized according to the doctor's orders. The bottles and nipples should be washed as soon as they are used, first with plain water to remove the milk, then with soapsuds and a bottle brush. The bottles should then be filled with boric acid or bicarbonate of soda solution until needed, when they should be emptied and placed in a deep pan filled with cold water and allowed to boil for a few minutes. They should not be taken from the water until they are to be filled with the milk mixture. The nipples are washed thoroughly and boiled once a day and dropped into a solution of boric acid or bicarbonate of soda when not in use. The plain black rubber nipples are best as they can easily be turned inside out and cleaned. If the milk drops too slowly from the bottle, the nipple may be pierced in one or two places with a darning needle.

The morning is the best time in which to prepare the baby's food; the milk has not stood too long and it is easier to regulate the feedings if a fresh start is made each morning. Let the bottles and the rubber corks with which they must be stopped be boiled and cooled while the milk mixture is being prepared.

Preparation of Diluents. — If barley or oatmeal water is to be used as a diluent, let that be prepared first, that it may be cool before adding it to the milk. Cover the table with a clean cloth or oilcloth, upon this place the pitcher in which the milk is to be modified, have the funnel, milk dipper, and spoon which are to be used boiled with the bottles, cover the mouth of the pitcher with a clean square of gauze or cheesecloth, read the formula carefully and measure the sugar, dextri-maltose, lactose, Mellin's Food, or cane sugar as directed and place it in a clean glass; now measure the diluent, water, oatmeal water, barley water, or whey; use part of this diluent to dissolve the sugar.

Measuring Milk according to Percentage of Fat. — Now dip off the required layer of top milk, that is, the layer

containing the desired percentage of fat and protein. Mix this thoroughly and dip out the requisite number of ounces into the pitcher. If there is not sufficient cream in one quart bottle to fill the formula, the cream must be dipped from a second bottle and mixed with that of the first before it is measured into the pitcher. The dissolved sugar and rest of the diluent, together with the correct amount of limewater, are strained into the pitcher, mixed thoroughly, and strained through the absorbent cotton lining the funnel into the bottles, allowing the correct number of ounces for each feeding in every bottle.

Pasteurizing the Milk. — The corks are then adjusted, the bottles placed in the pasteurizer[10] and pasteurized for the desired number of minutes. The water in the pasteurizer must be cold in the beginning and the rise of temperature recorded on the thermometer, which is adjusted at a convenient place in the pasteurizer where the scale can be read easily. If the temperature of the water is too high, add cold water and lower the flame beneath the pasteurizer. When the desired number of minutes has elapsed, lift the bottle rack above the water for a few minutes and allow a stream of cold water to flow into the pasteurizer, taking care not to chill the bottles too suddenly or they will crack. Cool the bottles as quickly as possible and place on ice until needed, warming the bottle of milk as needed in warm water.

Amount Given at Each Feeding. — At birth a baby will usually take from one half to one ounce at each feeding, this amount is increased at the rate of a quarter of an ounce each week until the baby is receiving eight ounces at each feeding. Or, the milk is measured to allow from 1.6 to 1.9 ounces per pound of body weight per day. This will be sufficient for the average well baby; for example, if a baby

[10] There are a number of pasteurizers on the market; one sold by the Walker Gordon Laboratory and one designed by Dr. R. G. Freeman of New York are both satisfactory.

weighs 14 pounds he would require $14 \times 1.6 = 22.4$ ounces of milk per day. Some babies are bigger and stronger than others and require the maximum amount, while others are less vigorous and the amount of food which they can handle at a feeding may fall slightly short of the above amounts, but the quantities indicated above will serve as a guide in measuring the formula.

Method of Calculation of Formula. — The calculation of a formula consists in determining the amount (in grams or ounces), of the various constituents contained in the formula when the percentage of each is known. Or, in determining its percentage composition when the amount of fat, protein, carbohydrate and diluent is given. There are certain inaccuracies in all simple methods of calculation and the use of the Babcock tester to determine the fat content in the milk to be used, is advised in all milk or formula rooms. The following method of calculation has been found satisfactory, and the nurse must master it in order to intelligently carry out the directions of the pediatrist.

Determining the Composition of Formula.[11] — Gravity cream and skimmed milk are used in this method, the cream is estimated as containing 16% fat, and consists of the entire cream layer from a quart bottle of milk which has been allowed to stand without being disturbed for six hours or longer. The cream must be dipped off with a cream dipper, or poured off. If there is not a sufficient number of ounces in one bottle of milk, a second must be used, the entire cream layer taken, then mixed with that obtained from first bottle, before the required number of ounces are measured off. Skimmed milk is estimated as being fat free (although this is not entirely accurate). Both gravity cream and skimmed milk are estimated as containing 3.2% protein, and 4.5% sugar. In this method,

[11] Method suggested by Morse and Talbot, "Diseases of Nutrition and Infant Feeding," pp. 234–235.

one rounded tablespoonful of milk sugar is estimated as weighing one-half ounce (dextri-maltose may be estimated in the same way). With this brief explanation of the terms used we will proceed with the method itself.

It is always essential before beginning the calculation of the formula, to know what percentages of fat, sugar, and protein it is to contain, and the amount to be given in twenty-four hours; it is also necessary to know how much lime water is to be added if this substance is to form a part of the formula.

Suppose a thirty-two-ounce mixture is to be made containing 3% of fat, 6% of sugar, 2% of protein, and lime water sufficient to equal 25% of the cream and skimmed milk in the mixture. The fat in the food must be derived from cream, since it is the only substance containing fat to be used in the formula. If the food was composed entirely of gravity cream it would contain 16% of fat. Since it is to contain but 3% of fat it is evident that only 3/16 of the mixture must be gravity cream, 3/16 of thirty-two ounces is six ounces. Six ounces of gravity cream will, therefore, provide the 3% of fat desired in the mixture. The gravity cream contains protein as well as fat. There are six ounces of gravity cream in the thirty-two-ounce mixture. The protein content of gravity cream is 3.2%. The protein content of a thirty-two-ounce mixture containing six ounces of gravity cream is evidently 6/32 of 3.2% or 0.60%. Two per cent protein is, however, desired in the mixture. The gravity cream has provided only 0.60%. One and forty hundredths per cent of protein, the difference between the percentage of protein desired and that furnished by the gravity cream, must be obtained in some other way. It must be obtained, moreover, from some substance which does not contain fat. Skimmed milk is such a substance. Skimmed milk contains 3.2% protein. In order to get 1.40 per cent in the mixture by the

use of skimmed milk, it is evident that 140/320 of the mixture must be skimmed milk. 140/320 of thirty-two ounces is fourteen ounces. Fourteen ounces of skimmed milk will, therefore, provide the additional 1.40% of protein desired.

Both gravity cream and skimmed milk contain 4.50% milk sugar. Twenty ounces of gravity and skimmed milk are required to furnish the desired percentages of fat and protein. These twenty ounces in a thirty-two-ounce mixture must add 20/32 or 4.50% of sugar to the mixture. Twenty thirty-seconds of 4½ or 20/32 of 9/2 = 180/64, or practically 3% of milk sugar. It is, however, desired to have 6% of milk sugar in the mixture. That is, 3% more of milk sugar is required. This additional sugar must be added in the form of dry milk sugar. Three per cent of thirty-two ounces is 3/100 of thirty-two. This will give the amount of sugar desired in ounces. The sugar is to be measured in rounded tablespoonfuls, or half ounces. If the figures given above are multiplied by two, the result will be the number of rounded tablespoonfuls needed. That is, 3/100 of 32x2 = 192/100 rounded tablespoonfuls, or for all practical purposes, two rounded tablespoonfuls.

It is also desired to have the amount of lime water in the mixture equal to 25% of the cream and milk in the mixture. There are twenty ounces of cream and milk in the mixture. Twenty-five per cent of twenty ounces is five ounces. Five ounces of lime water must therefore be added. The total quantity of the mixture is to be thirty-two ounces. The milk sugar goes into solution and, therefore, does not add to this quantity. The difference between thirty-two and twenty-five ounces is seven ounces. Seven ounces of water must, therefore, be added to make up the quantity desired.

Changing the Formula. — It is often found necessary to change the formula when using artificial feeding for in-

fants, and under these circumstances it is necessary to know the percentages of the food constituents contained in the formula already in use. For this purpose the following method, quoted from "Diseases of Nutrition and Infant Feeding,"[12] is included:

Morse and Talbot's Method. — Suppose that a baby is taking a food made up of —

Gravity cream	12 ounces
Skimmed milk	18 ounces
Limewater	6 ounces
Barley water	12 ounces
Milk sugar	4 rounded tablespoonfuls

"The barley water is made with two teaspoonfuls of barley flour in a pint of water. The total quantity of the mixture is 48 ounces. Gravity cream contains 16% fat. Twelve ounces of gravity cream in a 48-ounce mixture will give, therefore, 12/48 of 16% of fat, or 4% fat. Both gravity cream and skimmed milk contain 3.20% protein. There are 30 ounces of gravity cream and skimmed milk in the mixture; 30 ounces in a 48-ounce mixture will give 30/48 of 3.20% of protein, or 2.00% of protein. Both gravity cream and skimmed milk also contain 4.50% of sugar. Thirty ounces of gravity cream and skimmed milk in a 48-ounce mixture will therefore furnish 30/48 of 4½ which is the same as 30/48 of 9/2 or almost 3.00% of milk sugar. Four rounded tablespoonfuls of milk sugar are equal to two ounces. Two ounces of sugar in a 48-ounce mixture is equal to 2/48 of 100% or 4%. The total percentage of sugar is, therefore, 7%. Two teaspoonfuls of barley flour in a pint of water makes a 1.50% decoction of starch. Twelve ounces of barley water of this strength in a 48-ounce mixture will give 12/48 of 1.50% or about 0.35% starch. There are six ounces of limewater in the mixture and 30 ounces of gravity cream and skimmed milk. 6/30 of 100% is 20%. The

[12] "Diseases of Nutrition and Infant Feeding," pp. 225 and 226, by Morse and Talbot.

limewater is, therefore, 20% of the milk and cream. The mixture thus contains 4% fat, 7% sugar, 2% protein, and 0.35% starch, while the limewater is in the proportion of 20% of the cream and milk."

If, therefore, the nurse will follow out the plan suggested by Drs. Morse and Talbot, it should be a simple matter to change the percentage of any of the food constituents in any formula.

The following schemes for feeding well babies are included to facilitate the work in the home. A nurse may teach the mother the manner in which these schemes are used, keeping in mind that there can be no iron clad rule for feeding all babies. No nurse should recommend a formula without directions from a physician. And no formula should be changed without his permission.

The following milk formulas are used in the Nathan Straus Pasteurized Milk Laboratories of New York:

Formula No. 1. — Infants from 1st to 4th week, by A. R. Green.

24 ounces of mixture divided into 8 feedings of three ounces each, fed at intervals of 2½ hours:

¾ oz. 16% cream
3 oz. full milk
19 oz. water
1¼ oz. limewater
1½ oz. milk sugar

Formula No. 2. — Infants 1st to 3d month, by Dr. R. G. Freeman.

1½ oz. 16% cream
3 oz. full milk
13 oz. water
½ oz. limewater
1 oz. milk sugar

Divided into 6 feedings of 3 oz. each, fed 3 hours apart.

Formula No. 3. — Infants 2d to 6th month, by Dr. R. G. Freeman.

18 oz. full milk
16½ oz. water
1½ oz. limewater
1½ oz. milk sugar

Divided into 6 feedings of 6 ounces each, fed at intervals of 3 hours.

Formula No. 4. — Infants 3d to 7th month, by Dr. A. Jacobi.

18 oz. full milk
18 oz. barley water
1 oz. cane sugar
20 grains salt (less than ¼ tsp.)

Divided into 6 feedings of 6 ounces each, fed at intervals of 3 hours.

Formula No. 5. — Infants 7th to 9th month, by Dr. A. Jacobi.

2½ oz. full milk
7½ oz. oat or barley water
1½ oz. cane sugar
30 grains (about ¼ tsp.) table salt

Divided into 5 feedings of 6 ounces each, fed at intervals of 3½ hours.

Scheme for Feeding Normal Infants
(First Year)

Scheme based on Holt and Shaw's "Save the Babies." Pub. by Am. Med. Ass'n.

Whole Milk Method

Time	*Milk Ounces*	*Water Ounces*	*Sugar*	*Intervals of Feeding*	*Number of Feedings*
1st and 2d days.......		1 to 3 tbs. every 3–4 hours			
3d and 4th days.......	3	7	2 tsp.	3	7

SCHEME FOR FEEDING NORMAL INFANTS—*Cont.*

Time	*Milk Ounces*	*Water Ounces*	*Sugar*	*Intervals of Feeding*	*Number of Feedings*
5th and 7th days.......	4	8	3 tsp.	3	7
8th day......	5	10	$1\frac{1}{2}$ tbs.	3	7
8th day to end of 3d month.....	Increase $\frac{1}{2}$ oz. every 4 days	Increase $\frac{1}{2}$ oz. every 8 days	Increase $\frac{1}{2}$ oz. every 2 weeks	3	7–6
End of 3d month.....	16	16	$4\frac{1}{4}$ tbs.	3	6
Beginning of 4th month to end of 6th month..	Increase $\frac{1}{2}$ oz. every 6 days	Reduce $\frac{1}{2}$ oz. every 2 weeks. (Cook barley in water if food disagrees)[13]	4	4	6–5
End of 6th month.....	24	12	4	4	5
Beginning of 7th month to end of 9th month..	Increase $\frac{1}{2}$ oz. every week if food is well digested and child seems hungry	Reduce $\frac{1}{2}$ oz. every 2 weeks	4	4	5

At the beginning of 7th or 8th month, or earlier if necessary, it is advisable to add orange juice, giving from 1–2 tablespoonfuls between the two morning feedings.[14]

[13] One-half tbs. barley flour may be cooked in the water used as diluent; it should be boiled 20 minutes, strained and cooled before adding to formula.

[14] When babies are fed upon pasteurized, sterilized, or dried milk it is advisable to use orange or prune juice earlier than the seventh month. Dr. Hess suggests the use of canned tomato juice as substitute for orange juice.

Scheme for Feeding Normal Infants—*Cont.*

Time	*Milk Ounces*	*Water Ounces*	*Sugar*	*Intervals of Feeding*	*Number of Feedings*
End of 9th month.....	30	10 oz. (in which 3 tbs. of cereal is cooked)	2 tbsp.	4	5
Beginning of 10th month to end of 12th month	Increase 1 oz. per month	Cereal gruel as above	Reduce 1 tbs. per month	4–5	5–4

After the 4th month it is well to eliminate the night feeding between 10 P.M. and 6 A.M.

At end of 11th month add 1–2 pieces of stale bread, toast or zwieback. Part of soft cooked egg may be given every other day at noon meal by end of 11th month. The orange juice may be increased to 3 tbs. if bowels are not loose.

The strained cereal should be given twice daily by the end of the first year, and the milk should be undiluted at this time unless the digestion of the infant forbids.

Cooled boiled water should be given several times each day between feedings. Babies cry from thirst as well as from hunger.

SCHEME 2

For Feeding Well Babies

Scheme based on Dr. Richard M. Smith's "The Baby's First Two Years."

A full-term baby will usually take a formula made as follows:

Cream	2 ounces
Skimmed milk	2 ounces
Boiled water	12 ounces
Sugar of milk	6 level tsp.

After 3d day increase cream and milk at the rate of 1 ounce each week, and sugar 1 tsp. every other day until at one month the baby will be receiving a formula such as—

Cream	5 ounces
Skimmed milk	5 ounces
Boiled water	22 ounces
Sugar of milk	$3\frac{1}{2}$ level tbs.

At two months —

Cream	6 ounces
Skimmed milk	6 ounces
Boiled water	20 ounces
Sugar of milk	4 level tbs.

From this point the formula may be increased by adding 2 ounces of skimmed milk each month until the baby is eight months old. For each ounce of milk added, an equal amount of water should be omitted. The sugar in the formula should be reduced one half tbs. every three months.

At six months the baby would be taking —

Cream	6 ounces
Skimmed milk	14 ounces
Boiled water	12 ounces
Sugar of milk	3½ level tbs.

At eight months —

Cream	6 ounces
Skimmed milk	18 ounces
Boiled water	8 ounces
Sugar of milk	3 level tbs.

This amount will not be found sufficient in quantity for a twenty four-hour mixture for children of this age. Increasing the amount of the last formula in the same proportion, it will be —

Cream	9 ounces
Skimmed milk	27 ounces
Boiled water	12 ounces
Sugar of milk	4½ level tbs.

At this age the formula usually may be changed so as to be made from whole milk instead of cream and skimmed milk. The formula may be made as follows:

Whole milk	36 ounces
Boiled water	12 ounces
Sugar of milk	4½ level tbs.

From this point on the formula may be increased by replacing the boiled water with whole milk, two ounces each month up to thirteen months. At this age the boiled water may be omitted from the formula one ounce each week. Beginning at the age of eight months the sugar may be eliminated from the formula, one tablespoonful each month.

Barley Water. — At the age of five months, or at any time thereafter, barley water may be substituted for boiled water in the formula.

This should be substituted when the baby is not gaining in weight. It may be substituted in many instances when the movements are not well digested.

Lime Water. — It is frequently found to be advisable to add lime water. It is not necessary in every instance, but should be given if the baby is inclined to spit up, or in cases where the stools are too frequent in number and are slightly green in color.

Determining the Fuel Value of a Formula. — The computation of the fuel value of a formula is very essential since the growth and development of the infant depends largely upon whether or not its energy expenditures are well covered. The method is simple, requiring the same methods used in the computing of other dietaries. Take the formula just calculated, its fuel value would be estimated as follows: Thirty-two ounces are equal to 960 grams. In each 100 grams there would be 3 grams of fat, 2 grams of protein and 6 grams of sugar. Hence in 9.6 one-hundred-calorie portions there would be 9.6 x 3 — 28.8 grams of fat, 9.6 x 2 — 19.2 grams of protein, and 9.6 x 6 — 57.6 grams of sugar, in a thirty-two-ounce mixture.

To determine the fuel value of the formula, these results must be multiplied by their physiological fuel factors, 9 and 4 and 4 respectively. Thus:

$29 \times 9 = 261$ calories from fat
$19 \times 4 = 76$ calories from protein
$58 \times 4 = 232$ calories from sugar, or a total of
569 calories for the entire mixture.

Scheme for Adding Solids to Infants' Diet. —

From 9th to 15th month:

6 A.M. — Milk formula (bottle).
8 A.M. — Orange juice ½ ounce, or prune pulp or prune juice.
10 A.M. — Bottle, cereal (strained) and bread and butter or zwieback.

2 P.M. — Mutton, chicken, or veal soup cooked with cereal; small portion of baked potato, small portion of strained spinach or carrots; orange gelatin or cornstarch pudding.

6 P.M. — Bottle.

From 15 months to 2½ years:

8 A.M. — Stewed fruit or orange juice; cereal, crisp bacon, alternated with soft-cooked or poached egg; bread and butter or toast, milk or weak cocoa.

12 or 1 P.M. — Meat or vegetable soup thickened with cereal; lamb chop, scraped beef or chicken or beef juice; baked or mashed potato; strained spinach; carrots; turnips or celery; gelatin, custard, or cornstarch pudding.

3 P.M. — Crackers and milk.

6 or 7 P.M. — Bread and milk or cereal; baked apple or apple sauce.

From 3 to 6 years:

8 A.M. — Stewed fruit or orange; cereal; bacon or egg (soft-cooked or poached); bread and butter; milk or cocoa.

12 M. — Soup; lamb chop, scraped beef, chicken, or roast meats; potato; all vegetables; celery, lettuce; light desserts: custards, gelatin, lady fingers.

3 P.M. — Milk; fruit and crackers.

6 P.M. — Milk or cocoa; stewed fruit bread and butter; cereals; eggs.

Morse and Talbot advise baked potato, plain boiled macaroni, rice and wheat germ, bread and butter, baked custard, plain blanc-mange, and plain boiled tapioca to be given when the child is 1½ years old. When the child is nearly two years old they add meat in the most digestible forms, such as the white meat of chicken, lamb or mutton chops, and scraped beef.

The following dietary is suggested for a child two years old: [15]

"Whole milk, butter, mutton broth, chicken broth, beef juice, soft-cooked eggs, dropped eggs, white meat of chicken, lamb or mutton chops, scraped beef, French bread, stale bread, toasted bread, whole wheat bread, milk toast, zwieback, plain white crackers, plain Educator crackers, barley, jelly, oatmeal, cream of wheat, wheat germ, Ralston's Farina, rice, baked potato, plain boiled macaroni, orange juice, baked apples, stewed prune pulp and juice, junket, baked custard, cornstarch pudding, plain blanc-mange, plain tapioca. It is not advisable, as a rule, to begin green vegetables until the baby is 2½ years old."

It will be seen in the foregoing dietaries how authorities differ in their beliefs as to the requirements of the child. The dietaries included in this text are selected from those used in different parts of the country by physicians who have successfully cared for the infants and children under their charge.

THE FEEDING OF PREMATURE INFANTS

The digestion of premature infants is naturally not as strong as that of infants born at term. Very little is positively known, but the consensus of opinion goes to show that in the majority of cases the tolerance for sugar is

[15] "Disease of Nutrition and Infant Feeding," p. 236, by Morse and Talbot.

greater than that of either the proteins or fats. The loss of heat is relatively greater in proportion to its surface area in small than in large bodies. This is a well-known fact, hence the premature baby must require more food in proportion to its weight than the baby who is born at the normal time. Then, too, as the premature infant is thinner he does not keep warm like the older infant, and this must be taken into consideration in feeding him. Breast milk is of course by far the best food for such babies, not only because its constituents are in a more available form for the feeble digestive organs, but because the mother's milk furnishes a resistance which is lacking in even the most carefully modified of milk formulas.

Energy Requirements of Premature Infants.—Experiments made upon premature infants have proved that the caloric needs of these babies are greater than in the case of full-time babies; that is, they require more per kilogram of body weight. According to Morse[16] most premature babies need 120 calories per kilogram of body weight. But there are many exceptions, some thriving on as little as 70 calories per kilogram. No attempt should be made to reach 120 calories per kilogram during the first few days. Thirty calories per kilogram is as much as is wise to give in the first 24 hours of feeding. This amount should be gradually increased each day, watching carefully for symptoms of indigestion and diminishing it if these appear. One hundred and twenty calories per kilogram can be given in about 10 days."[17]

Necessary Dilution.—Even breast milk must be diluted with an equal amount of water or a 3% sugar solution. The amount of milk should be increased and the amount of dilution decreased until the undiluted breast

[16] Morse: "American Journal of Obstetrics," 1905. Hess: "American Journal Diseases of Children," 1911.

[17] "Diseases of Nutrition and Infant Feeding," p. 238, by Morse and Talbot.

milk is given in four or five days. Like older babies, the next best food for premature babies is the properly modified cow's milk, but the utmost care will have to be observed, as these babies are more easily upset than older and stronger ones.

Premature Infant Feeding.—The following method of feeding may be suggested, keeping in mind that it is an easy matter to increase the strength of a mixture if the baby shows the need of such an increase. The premature baby is rarely strong enough to take the breast.

Method of Administering Milk.—The most satisfactory method of administering the food in such cases is by means of the Breck feeder, which consists of a graduated glass tube, open at either end. On the small end is placed a small nipple like those seen on medicine droppers; this one is perforated and goes into the mouth of the baby. A large rubber finger cot is attached to the other end of the tube. The milk is forced into the mouth by pressing the finger cot. In case the infant is too feeble even for this method of feeding, the desired amount is dropped into the mouth from a medicine dropper; 5 cc. (about 1 dram or 1 teaspoonful) of diluted milk being given at each feeding. This amount is increased gradually from day to day.

Whey Mixtures.—Whey mixtures have been found to meet the needs of premature infants more efficiently than ordinary mixtures. As the proteins in whey are in a more digestible form, they throw less work on the immature digestive apparatus. As a rule the casein and whey are in proportion of 1: 1.

The following formulas [18] show the amounts in which the food constituents are combined and are suitable for premature babies:

[18] "Diseases of Nutrition and Infant Feeding," p. 239, by Morse and Talbot.

Fat	1.00%
Milk sugar	4.00%
Total proteins . . .	0.25%
Lime water	25% of cream and milk mixture

or

Fat	1.00%
Milk sugar	4.50%
Total proteins . . .	0.50%
Lime water	25% of cream and milk mixture

PROPRIETARY FOODS

A word as to the use of Proprietary Infant Foods: These prepared foods may be classified under four heads, as follows: (1) condensed milks; (2) malted foods, those consisting chiefly of carbohydrates in the form of maltose and dextrins; (3) those consisting almost entirely of starch, and (4) those composed partly of soluble and partly of insoluble carbohydrates.

Use of Prepared Foods for Infant Feeding.—The use of prepared foods for the feeding of infants is distinctly a province of the physician. In many instances it has been found advisable to substitute "dried, malted, or condensed milk" for cow's milk. The advantages of these foods are many, *i.e.* ease of preparation, cleanliness, and freedom from bacteria, and their keeping qualities (do not require ice to keep sweet).

The danger lies in the fact that unintelligent people often substitute the ready prepared foods without knowing just how to do so. The use of dried milk powders has of late grown in favor; this is chiefly because better results are often obtained with a milk of known composition than with formulas made from milk of questionable cleanliness and purity.

When a mother is given directions for mixing a given number of spoonfuls of dry milk in a given number of spoonfuls of water she is less likely to go wrong than she would if she had to make up a more complicated milk or milk and cream mixture.

When physicians give an order for lactic acid milk, protein or acidoliphus milk, if they know that a certain milk powder is being used, they can feel surer of what to expect.

The following formulas showing the use of some of the best known milk powders may serve to show the nurse how to use the prepared foods advantageously, but she must always keep in mind that the formula, whether it is made up from fresh cow's milk or from one of the Ready to Use Proprietary Foods, can only be prescribed by the physician.

Lactic-Acid Milk and Corn-Syrup Mixtures

Dr. McKim Marriat[19]

Age	Whole Lactic-Acid Milk	Dilute Corn-Syrup (50%)	No. of Feedings	Amount at Each Feeding
	Ounces	*Ounces*		*Ounces*
1 Week . .	10	2	6	2
2 Weeks . .	15	3	6	3
1 Month . .	21	3	6	4
2 Months . .	22	3	6	5
4 Months . .	27	3	6	6
6-10 Months .	32	3	6	7

All feedings are at four-hour intervals. After the age of six months, the diet is supplemented by the addition of cereal, vegetable purées and meat broth daily. No infant is forced to take the entire amount of feeding offered if he seems satisfied on a smaller amount. In the case of infants who fail to gain sufficiently rapidly and are not suffering from gastro-intestinal disturbances the amount of dilute corn syrup may be increased to 4 ounces and in some instances to 5 ounces in the entire day's feeding.

Method of Preparing Lactic Acid Milk.—(*a*) A culture of Bulgarian Bacillus is first prepared by inoculating a few

[19] Courtesy of Dr. McKim Marriat, Children's Hospital, St. Louis, Mo.

ounces of sterilized milk with a Bulgarian culture. This is incubated until sour. Add one tablespoonful of this culture to one quart of pasteurized or sterilized whole cow's milk and incubate for twelve hours. This is conveniently accomplished in the home by warming the milk to 100° F. and then transferring to a thermos bottle, in which it is allowed to stand overnight. Metod (B). This method consists in the addition of lactice acid to milk and is the easier method of preparation. The lactic acic used is the U. S. P. lactic acid, which costs about $1.00 per pound, and this is sufficient to make about sixty quarts, so that the expense per quart is less than two cents. The method of making it is to add two drams (8 c.c.) of lactic acid to a quart of pasteurized or sterilized whole milk. The milk should be cold at the time the acid is added. The acid is dropped in slowly, one drop at a time, while the milk is being stirred. In no instance is lactic acid milk further sterilized before use. It is simply mixed with the corn syrup and transferred to feeding bottles. Dilute commercial karo (blue label) corn syrup with an equal volume of water, thus making a 50% solution. Of this dilute solution two ounces by volume is equal to one ounce by weight of sugar.

Advantages of Lactic Acid Corn Syrup Mixtures.—It keeps well, even if not at a very low temperature; in fact, it will keep for a number of hours at room temperature. This is an advantage in case of people who do not have satisfactory ice boxes. Lactic acid acts to inhibit bacterial growth. Dr. Marriat is convinced, after trying this method over a number of years, that infants suffer less from gastro-intestinal disturbances and gain more rapidly in weight than with other customary methods. He finds that Karo corn syrup is less likely to lead to digestive disturbances than either cane or milk sugar. It possesses, according to Dr. Marriat, all the advantages of the more expensive sugar (Dextri-maltose, etc.) at a much lower cost.

DRYCO; S. M. A. AND KLIM, (DRIED MILK PRODUCTS USED IN INFANT FEEDING).

FEEDING TABLE FOR USE OF DRYCO [20]

Weight of infant in Pounds	*Dryco Each Feeding in Level Tbs.*	*Amt. of Water Each Feeding in Ounces*	*No. Feedings per Day*	*Intervals of Feeding*	*Total Calories per Day*
5	2	2½	7	3	224
6	2½	3	7	3	280
7	3	3½	7	3	336
8	3	4	7	3	336
9	3½	4½	7	3	392
10	4	5	7	3	448
11	4	5	7	3	448
12	5	6	6	3	480
13	5½	6½	6	3	528
14	6	7	6	3	576
15	6½	7½	6	3	624
16	8	8	5	4	640
17	8	8	5	4	640
18	8	8	5	4	640

1 ounce by weight—127 calories.
8 level tablespoonfuls (leveled with knife)—1 ounce by weight.
1 level tablespoonful (leveled with knife)—16 calories.

The simplest general rule is to give 2½ level tablespoonfuls per day for each pound of the infant's weight. Dissolve in one more ounce of water than there are tablespoonfuls of Dryco per feeding.

S. M. A.[21] is a milk preparation sold on physician's prescription with directions given by him for its use in every individual case. Like other dry milk preparations it is most valuable for use in homes where there are no cooling facilities; in traveling, where each food must be prepared fresh; and as a supplementary food, where it is desirable to be able to know the exact calorie value of the material added, as well as its chemical constituents.

Klim [22] is the solids of pure milk. It is put up in three

[20] Feeding table as given by The Dry Milk Company.

[21] S. M. A. manufactured by the Laboratory Products Co., Cleveland, Ohio.

[22] Klim, Merrell-Soule Company, Syracuse, N. Y. This company also puts up a buttermilk in powder form ("Akrelac"), and a "Protein" milk, in powder form.

forms—"Klim Whole Milk," "Klim Skimmed Milk," and a powdered modified milk sold under the name of "Albulac." The whole milk klim is reliquefied by allowing 4½ ounces (18 level tablespoonfuls) to one quart of water; Klim made from skimmed milk is reliquefied by allowing 3½ ounces klim (14 level tablespoonfuls) to one quart of water. In using the modified preparation, unless otherwise directed, use one ounce (3½ packed level tablespoonfuls) Albulac to 7 ounces water.

Klim can be used in any recipe calling for milk. It may be substituted for thin cream by using only half the amount of water to reliquefy. Like *Dryco*, or fresh milk, Klim must be regulated, as to amount and type, by the physician.

Malted Milk (Horlick's) Formula.—Varying quantities of malted milk may be used, according to the directions of the physician; the following formula is suggested (by Horlick's Malted Milk Co.) for infants of five months:

Horlick's Malted Milk	3 level tablespoonfuls
Water	5 ounces
Plain milk	3 tablespoonfuls

MELLIN'S FOOD FORMULA

SEVEN MONTHS (ABOUT)

Average weight 17 pounds

Mellin's Food	9 level tablespoonfuls
Whole Milk	30 fluid ounces
Water	10 fluid ounces

(Amount sufficient for 24 hours)

Give baby 6½ ounces every 3 hours.

SUMMARY

Breast Milk as a Food.—The superiority of breast milk over any other known food cannot be too strongly emphasized.

Regularity in Feeding.—The absolute need for regularity in feeding—"feeding by the clock" and not by guess or when the baby cries.

Indications of Health.—The normal growth and de-

velopment to be used as guides as to the physical well-being of the infant; also as an indication of the use of the proper modification of milk for the individual needs of the child.

Dilution.—The amount of dilution necessary—cereal waters, whey, etc.—to increase the digestibility and nutrient values of the formula.

The Addition of Alkali.—The addition of alkalies to milk formulas to accomplish a like purpose.

Milk Sugar, Malt Sugar, Cane Sugar.—The use of the different sugars, namely, dextri-maltose, lactose, or cane sugar under various circumstances as the condition of the infant demands.

Substitutes for Whole Milk.—The substitution of different milk, such as lactic acid milk, Bulgarian culture buttermilk, Eiweissmilch, cream and whey mixtures, as the individual needs of the infant demand.

Technique of Milk Modifications.—The absolute need for the nurse to understand the technique of milk modification before attempting the care of an artificially fed infant.

Percentage Computation.—A knowledge of percentage, that an accurate computation of a formula may be accomplished.

Preparation of Food.—A sufficient knowledge of food preparation to enable the nurse to prepare any food which may be deemed necessary by the physician for the welfare of the child.

Water.—The importance of giving the baby water aside from that used in modifying the milk. Many babies cry from thirst when they are believed to be crying from hunger or temper.

Increasing the Diet.—The necessity for increasing the amount and strength of the formula with the age, growth, and development of the child by the addition of solid food as soon as the physician deems it advisable.

Feeding Premature Infants.—The method of feeding

a premature infant differs from that employed in feeding an infant born at term: (*a*) because its development has not progressed so far; (*b*) because its digestive apparatus being more or less immature, food handled with ease by an older baby will be totally unfit for the premature one, both as to quality and quantity.

Wet Nurse.—The advisability of procuring a wet nurse when the mother is unable to nurse the infant, (*a*) on account of the more digestible character of the food constituents, especially the proteins, in mother's milk over those of cow's milk; (*b*) on account of the resistance furnished by the natural food which has been proved to be very much greater than that furnished by any other food, no matter how carefully the modification of the milk is made.

Premature Infants.—Their caloric needs are greater than in full-term babies, hence their food must be adjusted to meet these needs.

In fact the nurse must have an understanding of the behavior of foods in the metabolism of infancy and the laws which govern their use in the organism of the child.

PROBLEMS

(*a*) Write a formula for a two months' old infant weighing twelve pounds, which contains 3% fat, 2% protein, and 6% sugar.

(*b*) Change this formula so that it will contain 3% fat, 1.5% protein, and 6% sugar.

(*c*) Write a formula for an eight months' old baby, using whole milk instead of cream and skimmed milk.

(*d*) Write a formula for a premature baby containing 1% fat, 4% sugar, and 0.25% protein (allowing 30 calories per pound of body weight).

CHAPTER X

CARE AND FEEDING OF INFANTS AND CHILDREN IN ABNORMAL CONDITIONS AND IN INFECTIOUS DISEASES

Digestive Disturbances. — It is a well-established fact that artificially fed infants are more subject to disturbances due to diet than breast-fed infants, the digestional disturbances of the latter yielding more readily to treatment. As a rule, with the breast-fed baby it is largely a question of adjusting the diet of the mother, of increasing the fluid in her diet, of seeing that she takes the requisite amount of exercise in the open air, and of lengthening the intervals between feedings or of giving the baby water just before putting him to the breast. With the artificially fed infant it is an entirely different proposition.

Causes in Artificially Fed Infants. — The digestive disturbances may arise from any one of half a dozen or more causes. The constituents in the milk may be in the wrong proportion. The amount given at a feeding may be too great or too little. The dilution may be too great or too small to meet the needs of the infant. Or the milk may contain the microörganisms which bring about fermentation or putrefaction. Any or all of these causes may assail the artificially fed baby. Consequently, all the care that can be exercised must be resorted to in the feeding of these babies, not only after digestional disturbances arise, but as a means of their prevention. In the preceding chapter the methods generally used in the feeding of normal infants were discussed. We now proceed to the feeding under abnormal or pathological conditions.

Errors in Diet. — The majority of the ills from which the baby suffers can be traced primarily to **errors in diet** and in most of these cases the treatment consists chiefly in adjusting the formula to suit the condition. As a rule, these errors may be placed under two heads: those that are brought on by underfeeding and those induced by overfeeding. The pathological conditions arising from underfeeding are due not only to a lack of food, but chiefly to the improper balancing of the different food constituents in the formula. As has already been stated, so much food is required to cover the energy expenditures, so much for maintenance, and so much for storage for the growth and development necessary during the entire period from birth to maturity. These constituents must be regulated to the individual needs of the infant.

Over- and Under-dilution. — If the dilution is too great, the infant, while receiving the correct amount of the mixture, may have the necessary food constituents so reduced as to have them fail completely to do their appointed work in the body. Or if the amount of diluent is too small the baby may be receiving too strong a mixture, and develop nutritional disturbances therefrom. Under the first head the child suffers from underfeeding; the appetite is satisfied before enough of the actual food is ingested to meet his various needs. However, it is probable that the artificially fed infant suffers from the results of over-, rather than of under-feeding.

DISEASES DUE TO ERRORS IN DIET

Gastro-intestinal disturbances, colic, enterocolitis, colitis, etc., rickets, scurvy, nephritis, and diabetes are among the diseases most apt to develop from injudicious feeding, and in these cases the dietetic treatment plays the most important part in combating the condition. The disturbances caused by food are recognized by the general symptoms:

vomiting, rise of temperature, subnormal temperature, and the stools, the latter being the chief point of observation.

Fats as Cause. — When the fats are causing the disturbance, the rise of temperature is apt to be high, but not of long duration. The baby vomits frequently, the vomitus being acid in reaction and odor, the latter due to the presence of fatty acids, butyric acid, etc. Diarrhea often develops in a more or less acute form. In these cases there is a loss of sodium and other alkaline salts in the feces, and a consequent excess of ammonia in the urine, resulting in acidosis. Acid intoxication has been known to develop as a result of this loss of alkaline salts. The chief symptoms of this condition are rapid and deep respiration, stupor or restlessness, and cherry-red lips.[1]

Symptoms of Excess Fat in Diets. — The general symptoms in infants receiving an excess of fat in their food take the form of loss of appetite, with more or less loss of weight, or failure to gain. When the cases are not chronic, soft curds may often be seen, which are at times mistaken for casein curds, but may be distinguished from them by their translucent appearance and their solubility in ether. The color of the stools due to the excess of fat under the above-mentioned conditions is shiny and gray. In the majority of cases, especially of a more chronic character, the stools are apt to be large and dry, at times hard and crumbly. The fat in such stools is combined with magnesium and calcium salts, forming the characteristic " soap stools." [2] The combined loss of these salts in the feces has a definite effect on the general metabolism and nutrition, giving rise to rickets.

Regulating the Fat. — The treatment consists chiefly of regulating the amount of fat in the formula, and of cutting it out altogether in the beginning when the symptoms

[1] "Diseases of Nutrition and Infant Feeding," by Morse and Talbot.
[2] *Ibid.*

show acute acid conditions. In many cases, if the baby is given breast milk, the trouble disappears. At other times it is necesary to substitute a foreign fat such as olive oil for the butter fat. Dr. Ladd in the Children's Hospital in Boston treated many babies who manifested an intolerance for butter fat with "Homogenized Milk," which consisted of skimmed or separated milk and a certain percentage of olive oil, placed in an apparatus which brought about a more complete division of the fat, causing it to mix with the milk as an emulsion closely resembling human milk.

Fat intolerance is most difficult to overcome, the baby being apt to relapse into the acute stage unless the utmost caution is observed in adding the fats to the formula. It is not safe, however, to feed the baby upon a fat-free milk for any great length of time.

Excess Protein in Food. — The digestional disturbances arising from too much protein in the food are as a rule readily overcome in breast-fed infants. When it is due to nervousness or worry in the mother, it disappears as soon as the mother ceases to worry or does something to remove the cause of the nervous condition. When the breast milk is high in protein, more exercise in the open air at times adjusts the percentage of protein, provided the mother does not become over-tired, in which case the percentage of protein in breast milk increases.

Evidences of Excess Protein. — The symptoms of excess protein in the diet of the breast-fed baby are colic and flatulence, which are often persistent and difficult to overcome. Vomiting is not so common in these babies as in those who are artificially fed. The stools are increased in number, are either brown or green, and generally loose and watery. In artificially fed infants the symptoms are much the same, except that the vomitus often contains large curds which are tough and leathery. The baby suffers from gas formation and colic. The stools are at times normal, except

for the presence of large, hard curds; at other times they are increased in number, and are of a watery consistency and alkaline in reaction.

Regulating the Protein in Formula. — When the stools are watery and brown and musty in odor as the result of disturbed protein digestion, the treatment consists of taking out the proteins from the formula and of substituting cereal water, to which dextri-maltose or milk sugar is added, the milk being added as soon as possible to prevent too great a loss of body protein. As a rule the whey proteins do not cause the disturbances so often as the casein proteins; and at times it is possible to use whey mixtures with babies who cannot tolerate the casein at all.

Buttermilk also is used in cases of protein indigestion, as is Eiweissmilch and peptonized milk.

Regulating the Carbohydrates. — When the disturbances are due to the carbohydrates in the formula, they may be digestional or nutritional. In this form the milk sugar is more apt to be the cause of the trouble than the dextri-maltose preparations which are at times used. In the latter, when the disturbance becomes nutritional, the cause of the trouble can usually be traced to an excess of starch. When the percentage of milk sugar is greater than can be handled by the digestive apparatus of the baby, it is manifested by frequent attacks of colic, with the passage of watery green stools, highly irritating in character on account of their acidity. In acute cases the loss of weight is often marked, and symptoms of intoxication may develop. The outlook is grave in the very severe cases, but if the baby can survive forty-eight hours after the acute symptoms develop, he is apt to pull through the attack.

Adjusting the Sugars. — The treatment in these conditions consists of eliminating the milk sugar from the formula; in less severe cases dextri-maltose may be substituted. As a rule, coincident with indigestion caused by

sugar there will be found to be an intolerance for much fat, so that this must be adjusted as well as the milk sugar. Skimmed milk mixtures, containing a certain amount of barley or oatmeal water, are generally found to be suitable in these cases. Dextri-maltose may be added after a few days in order to maintain the fuel needs of the body. Eiweissmilch is at times used, but whey mixtures are contra-indicated on account of their high sugar content.

Dextri-maltose also disagrees at times. The baby has colic and flatulence, the stools are usually loose or watery and dark brown in color. The dietetic treatment consists of an immediate withdrawal of the dextri-maltose preparation and a substitution of milk sugar after a few days.

Evidences of Excess Starch in Formula. — The disturbances arising from an excess of starch in the diet are, as has already been stated, more apt to be of a chronic than an acute character. Vomiting is not a common symptom under these conditions, although colic is frequent. The stools are at times loose and brown, at other times dry and small. The baby at times suffers from diarrhea and at others from constipation. When the disturbance is acute the starch must be entirely eliminated from the formula. If proprietary foods are being used containing starch, whether it is dextrinized or unchanged, they must be at once abandoned, and a formula made up of protein with sugar and fat.

Modified Milk Formulas Suggested by Morse and Talbot for These Conditions

Fat	1.00%	or	Fat	2.00%
Milk sugar	4.00%		Milk sugar	5.00%
Protein	0.75%		Protein	1.25%

They likewise advise whey and whey mixtures under these circumstances.

Fermentation. — Fermentation is often the cause of infantile indigestion. At times it is acute and may cause a decided elevation of temperature owing to the absorption

of the toxic substances formed as a result of the bacterial action. In almost every case of indigestion brought on by fermentation there will be an accompanying diarrhea. As a rule the carbohydrates are more liable to the attacks of bacteria in the stomach than the other food constituents.

Treatment. — The treatment consists first of starvation, no food being given for at least twenty-four hours. Then water or weak tea, sweetened with saccharin, may be given, but nothing else. The medical treatment must be left to the discretion of the physician. When the condition warrants a return to food the formula must be made weaker than that which has caused the disturbance. Malt soup mixtures, buttermilk mixtures, whey and albumen water may be added as the condition of the baby improves. In older children the period of starvation may have to exceed that of infants, but a gradual return to normal diet is made. Weak tea and toast may be given after the first twenty-four hours and well skimmed meat broths, soft-cooked eggs, liquid peptonoids, and malted milk added to the diet as the condition of the child improves.

ENTEROCOLITIS

The dietetic treatment for enterocolitis must be adjusted according to the principal symptom. In some of these cases diarrhea is most prominent, while in others constipation is the most marked symptom. Hence the diet must be such as not only to do no harm to the child, but one that will aid in his ultimate recovery.

DIARRHEA

The treatment for diarrhea, whether it is from fermentation or putrefaction of food, has already been explained. The grave danger in the putrefactive diarrhea is the absorption of the toxic substances which result from bacterial action upon the unabsorbed food material in the small and

large intestine. In these cases auto-intoxication may develop and the baby may die before the condition yields to treatment. The entire intestine must be cleansed as a rule. The stomach of the baby may be reached with little trouble by using a small rubber catheter attached to a glass funnel and a solution of bicarbonate of soda. The bowels may be emptied by means of a soapsuds enema. Older children may be given oil, but this of course comes under the jurisdiction of the physician.

ACUTE DIARRHEA

Time	*Material*	*Amount*	*Intervals of Feeding*
Starvation period	Weak tea with saccharin	1 qt. sterile water, 1 gr. saccharine	2-hour intervals
Second day or following starvation	$^1/_3$ whole milk, $^2/_3$ water or thin oatmeal gruel	Total daily quantity of milk not to exceed 6–18 ounces	6 feedings of 1 to 3 ounces each
	Weak tea with saccharin	25 oz. or enough to bring total quantity of fluid up to 1 qt.	Given between feedings
Or on second day substitute buttermilk, "eiweiss" Larason, or Hoos' protein milk	Buttermilk or protein milk	Substitute for whole milk or given in equal parts water and milk	Six feedings of from 1 ounce each, as directed above

The above diet is decidedly insufficient for a normal baby; hence, if kept up over an extended period, the nurse must be warned of the danger of underfeeding. She should be able to recognize the so-called "hunger stools" (starvation stools of underfed infants). These stools, as a rule, are greenish brown in color, small in amount, more or less frequent in number, and are composed chiefly of mucus. According to the opinion of the pediatritian, such stools are indicative of a resumption of food, and must not be mis-

taken for the stools resulting from intestinal indigestion, which contain small curds, and which require a restriction of the diet. Dr. Julius Hess mentions the possibility of substituting a certain amount of fat for the carbohydrates, usually added to bring up the fuel value (calories) of the diet, but states that this will have to be undertaken with caution. Dr. Hess suggests the use of cod liver oil in small doses, beginning with 1 mil. twice daily with young infants, and increasing the amount to 4 mils. per dose.

CONSTIPATION

Constipation is one of the most frequent troubles visited upon people of all ages. "It is not a disease, it is a condition in which the number of stools is less or the consistency of the stools is greater than is normal for the individual at the given time."[3] It may be caused by neglect of the bowels, which should be evacuated once or twice every day during infancy and once a day after that period. If the habit of emptying the bowels every day is established in infancy it adds much to the health and comfort of the individual during the entire remainder of life. Babies are sometimes constipated as the result of the opium administered in soothing sirups. Others inherit constipation, while still others are constipated by the taking of the wrong kind of food or too little food. In any case it is decidedly bad to resort to drugs, since the habit of taking cathartics is so easily acquired and so difficult to overcome.

Factors Inducing Constipation.—With artificially fed babies a formula which contains too high a percentage of diluent and too low a percentage of solids will cause constipation, chiefly because the solids are so completely absorbed that they have no residue to form feces. A formula with too low a fat content in proportion to its protein and

[3] "Diseases of Nutrition and Infant Feeding," p. 307, by Morse and Talbot.

carbohydrates may cause constipation because the latter two constituents are almost entirely absorbed, and the feces, which is largely made up of the fat, is correspondingly small. Excess of fat, however, has been proved to be one of the chief causes of constipation in infants, as has also been the case with excess starch. Boiling the milk for the baby at times results in constipation. Hence sterilization is more frequently to blame for the condition than the pasteurization of milk.

Constipation during Second Year.—During the second year, if the child is given too much milk and too little solid food, constipation is very apt to be the result. A maximum quantity of from thirty-two to forty ounces may be given. In many diseases brought on by malnutrition, constipation is an obstinate condition to be overcome. This is especially the case in rickets and anemia.

Use of Laxative Foods.—After the baby is a few months old, orange juice is given between the morning feedings. Malted foods likewise exert a laxative effect. The higher the percentage of maltose, the more laxative the food. The nurse must keep this point in mind in feeding babies. With older children and adults, the question of diet for constipation is quite as important as it is for infants. Prunes or figs cooked with senna leaves and thoroughly strained furnish an excellent adjunct to the diet under such conditions. The coarse breads such as bran and Graham or wholewheat bread should be used instead of white flour breads. Care should be taken in advising a cereal diet for children, since cereals, with the exception of oats, are apt to be constipating. Fresh fruits, stewed fruits, and fresh vegetables are all good under the above-mentioned conditions. Young children require the vegetables strained or cut fine. Adults should include one coarse vegetable a day in their dietary to obviate the development of constipation. Children should be taught to drink plenty of water, and babies should not be neglected in this respect. As a rule,

very few adults drink as much water as is necessary for the general welfare of their bodies.

SCURVY

There is probably no disease of infancy which has come in for more study in the past few years than scurvy.

Cause.—The disease is believed to be directly due to a deficiency in the diet of the anti-scorbutic vitamin, known as "Water soluble C."

Treatment.—For many years it was known that lime juice exerted a curative effect upon scurvy. But recently the efficiency of this fruit juice has proved to fall far short of that effected by either orange, or tomato juice.

Feeding experiments have proved that animals, fed upon rations consisting of dry food without the addition of green, will develop scurvy. And that the milk of such animals will show a deficiency in the "C" vitamin which will lead to a development of the disease in infants fed upon such milk.

Milk is, in fact, by no means a perfect food, so far as its vitamin content is concerned. First, because the presence of the vitamin in milk is so dependent upon the diet of the mother or the animal, second, because the pasteurization temperatures used to insure cow's milk of purity from a bacterial standpoint, destroys in it the greater part of its antiscorbutic power. Either of which makes it necessary to supplement the formula of the artificially fed infant, and, in case of the former, the mother's milk of the breast fed baby, with orange, or canned tomato juice.

The amount of either of the fruit juices which is necessary to insure the child of a freedom from scurvy, is small, ranging from one-half to one ounce of strained juice daily, this amount is increased gradually until the child is taking from one and one-half to two ounces each day. It has been found advisable to administer the fruit juice between the two morning feedings. As a rule, the fruit juices are given

at the beginning of the seventh month, but they may be given at a much earlier date, the time being adjusted by the physician.

RICKETS

Definition.—Park defines rickets as "A condition in which the mineral metabolism is disturbed in a way that calcification of the bones does not take place normally."

Causes.—It is believed that rickets may be caused by (*a*) a lack of balance between the calcium and phosphorus, as well as a deficiency of either of these minerals supplied through the blood, (*b*) by the deficiency of the antirachitic vitamin, (*c*) by a deficiency of the ultra violet irradiations, usually from the direct rays of the sun.

Prevention.—It appears that since there are so many factors which intervene to prevent the bones from receiving their full pro rata of calcium and phosphorus that especial attention should be given to the study of conditions surrounding each child in order to overcome as far as possible the dangers which are more or less to blame for the development of rickets. The points to be given direct attention are: Mineral content of food, (*b*) the presence in the diet of foods known to be rich in the antirachitic vitamin, (*c*) the subjection of every child to a certain period of direct exposure to the sun's rays, or lacking that, treatment with the mercury vapor quartz lamp which produces the ultra violet ray so essential to the utilization of the calcium and phosphorus by the bones.

It is believed that the light and the vitamin are interchangeable as antirachitic agents, that the ultra violet irradiation either from the sun or from the lamp, act by formation of the antirachitic vitamin from cholesterol in the skin.[4]

Foods rich in the antirachitic vitamin: Egg yolk, whole milk, green vegetables, cod liver oil.

[4] Chemistry of Food and Nutrition, 3rd ed., p. 477, by Sherman.

Foods rich in calcium:[5] Milk, fruits, green vegetables, to a less extent cereals.

Foods rich in phosphorus:[5] Milk, egg yolk, vegetables, fruits.

Cod Liver Oil.—The dosage of cod liver oil may be estimated to supply the antirachitic vitamin as follows: 10 drops to ½ teaspoonful three times a day for babies. This amount should be increased to 1 teaspoonful three times each day for older children.

MALNUTRITION

Malnutrition is not confined to the children of the poor, though it is more common with infants of parents who have not the means to secure the best milk and give them the benefit of wholesome surroundings and plenty of sunshine. But babies of people in moderate circumstances, and even of wealthy parentage, are at times badly nourished, and require the same exacting care, the same attention to the food, the fresh air, and the sunshine that the poorer babies need in order to survive. Malnutrition may be the result of insufficient food, and it may also be due to the lack of one definite food element. Again, it may be brought on by some deformity of the mouth or stomach, which makes it impossible for the baby to get all the food which he requires for his maintenance and growth. He may be born prematurely and his digestive apparatus not be sufficiently developed to care for the amount or type of food necessary for his needs, or he may have some congenital weakness which interferes with the absorption and assimilation of his food. All of these points must be considered.

Evidences of Correct Feeding.—If the baby shows a

[5] A recently completed study made of twelve children to determine the calcium and phosphorus requirements proved that an optimum storage was only obtained when a quart of milk a day was allowed. This study revealed the fact that cereals did not furnish the type of calcium most efficiently utilized by the growing body. (Sherman and Hawley Journal of Biological Chemistry and Jour. Home Economics, Aug. 1922 and Sept. 1922 respectively.)

steady gain, both in weight and growth of stature, without digestional disturbances, the food given him is probably correct, but it must be kept in mind that nutritional disturbances, such as rickets and scurvy, are slow in developing, and do not manifest themselves with anything like the rapidity of digestional disturbances. Hence the nurse must take care as far as she is able, not only to prevent the food from causing indigestion, but also to see that it is not given in such a form as to induce those graver and more lasting nutritional disturbances which affect the entire system from infancy throughout the life of the individual.

SUMMARY

Breast Feeding versus Artificial Feeding.—There is no doubt about the fact that the breast-fed baby suffers less from digestional disturbances and has more resistance to disease than the baby fed even upon a perfectly prepared artificial food. The majority of diseases manifested by artificially fed infants have their origin in the following errors in diet.

Over-Feeding.—Resulting in acute gastro-intestinal disturbances (colic, entero-colitis, colitis, constipation).

Under-Feeding.—Resulting in chronic, and acute deficiency diseases (scurvy, rickets, malnutrition).

Evidences of Dietetic Errors.—The stools, showing characteristic evidences of excessive quantities of, protein, fat, or carbohydrates in the formula. Loss of weight or failure to gain. The development of deficiency diseases (scurvy, rickets, xerophthalmia, rickets and malnutrition).

Evidences of Correctness in Feeding.—Normal gain, freedom from gastro-intestinal disturbances, and deficiency diseases. Rosy cheeks, bright eyes, and a vigorous body.

Treatment in Abnormal Conditions.—The treatment consists in adjusting the diet to meet the needs of the particular disturbance manifested. Plenty of fresh air, sunshine and sleep.

Relapse.—One danger which the nurse must always be on the lookout foı is the relapse into the acute stage. The diet is the chief treatment. In acute gastro-intestinal disturbances rest from food is essential for at least twenty-four hours. Some infants can easily endure starvation for this short period. However, when malnutrition has already been established, it is not wise to carry out the starvation treatment over-long. A cautious return to a normal diet may be made as soon as acute symptoms disappear.

FEEDING IN INFECTIOUS CONDITIONS

Fevers in General.—It requires very little deviation from the normal to raise the temperature of a child. A slight attack of indigestion, a slight soreness of the throat, will bring up the temperature of some children out of all proportion to the seriousness of the disorder.

Diet in Fevers of Short Duration.—As a rule, in the fevers of short duration, such as intermittent fever, malarial fever, etc., the diet is a simple matter. Milk is given when it agrees, with buttermilk, koumiss, broths, and albuminized beverages to vary the diet.

Diet in Infectious Diseases.—When, however, the fever is induced by specific bacteria, such as in the case of typhoid and scarlet fever, the diet is a different matter altogether. The disease may be one in which the diet is the chief item of importance; such is the case with typhoid and scarlet fever, with the former because of its long duration, the increased rate of metabolism due to both the fever and the action of the bacteria making it necessary to increase the normal amount of food to meet the new requirements of the body; and with the latter on account of the kidney complications which must be guarded against, and which can only be handled by regulating the diet.

Infant Feeding.—The feeding of infants under febrile conditions resolves itself into an adjustment of the milk formula to meet the existing state of affairs. The digestion

is always more or less disturbed by fever, especially during the early stages.

Restricting the Food.—It is not always possible to diagnose the disease immediately, so that the safe thing to do is to lengthen the intervals between the feedings for the breast-fed baby and to stop food entirely for twelve to twenty-four hours for those who are artificially fed, when there is any doubt as to the cause of the rise of temperature. Some mothers find it difficult, if not impossible, to institute this period of starvation. In these cases barley water or albumen water may be given at stated intervals. Many physicians give very weak tea, slightly sweetened, under the above conditions; it does no harm to the baby and relieves the mother from the belief that her child is being starved to death. In twenty-four hours, if the fever arises from disturbed digestion, some manifestation of the condition will be observed.

Bacterial Activity.—In cases of intestinal putrefaction the fever is apt to rise at an alarming rate and is controlled only by removing the cause. The proteins which have escaped digestion and absorption in the intestines furnish the best medium for the growth of putrefactive bacteria. Hence this food constituent must be given in its most digestible form.

Dietetic Treatment.—Milk in most instances is the best form in which to give protein food, especially to young children and babies. At times, however, it will be found that milk disagrees; it must be peptonized, or one of the fermented milks, such as buttermilk (Bulgarian culture), Eiweissmilch, or koumiss must be substituted. In cases where the putrefactive bacteria make it unwise to use milk at all, for a time the proteins should be furnished in the form of cereal gruels, and the juice of an orange strained and diluted given once or twice a day between the morning and evening feedings.

Whey is contraindicated in cases where the fever is

brought on by putrefaction in the intestine, chiefly because it furnishes one of the best mediums known for the growth of the offending bacteria.

Patience is required in handling the diet for fevers in infancy. As has already been stated, it requires a very slight cause to raise the temperature of a child, but for this very reason especial care must be observed that no enlightening symptom escapes the notice of the nurse.

Complications.—Tuberculosis or scurvy may be in an incipient stage, and may be overcome if recognized in time. The nurse has a better opportunity for observing changes in an infant or child under her care than the physician who comes once a day or less. The nurse should make note of these changes, that the physician may have a chance to regulate the diet accordingly.

Fluid Diet.—With children, as with adults, the energy output in fever is greater than in health, hence the need for plenty of fluids to help eliminate the waste products due to the increased metabolism. These fluids may consist of water, fruit beverages, cereal water, whey, and broth. It is well for the nurse to remember that when the child is confined to bed, he will not need so much food as he would if he were up and about, but that if the fever is of long duration, as in typhoid, the increased rate of metabolism must be met by an increased amount of food, as the ordinary requirement standards for a child in health cannot be applied to the diet of a child under these conditions.

SCARLET FEVER

Scarlet fever is an acute infectious disease, characterized by high fever, sore throat, a red rash, and a tendency to nephritis. The disease usually begins suddenly with an attack of vomiting; the temperature rises to 104° or 105° and on the first or second day a rash appears, first on the chest and neck, and spreads over the entire body. This lasts from three to seven days, desquamation begins soon

after the rash disappears and lasts from two weeks to six, the palms of the hands and soles of the feet peeling last. The appearance of the tongue is very characteristic, being coated, and through this coating are seen a few bright red points, producing the well-known strawberry tongue. After a few days the coating disappears, leaving the tongue bright red. In mild cases the tonsils are enlarged and the throat very red. In severe cases there may be difficulty in distinguishing the disease from diphtheria without a culture being taken. The tendency of the child to develop nephritis during the second or third weeks makes the treatment largely dietetic in character.

Dietetic Treatment.—Milk is the chief diet for the first three weeks. If it disagrees, it should be modified or peptonized to suit the condition. Koumiss and buttermilk may be substituted when it is impossible to prepare the milk so that it will not cause digestional disturbances. This, however, is seldom found to be the case during infancy. Malted milk and even condensed milk, or some of the dextrinized and malted foods at times prove valuable when whole milk disagrees. But the nurse must remember that a baby runs a risk of developing nutritional diseases of a grave character if fresh milk is eliminated from the diet for any great length of time.

Older children may have plain vanilla ice cream and plain junket, oyster or clam broth made with milk, the oysters and clams carefully strained out. Lemonade and orange juice may be given, but no meat broths or albumenized beverages or egg dishes can be admitted to the dietary.

Development of Nephritis.—Nephritis must be guarded against. The skin, being covered with a rash, is put out of commission as an excretory organ; in consequence all of the work of this description is placed upon the kidneys. In the first part of this text the work of the kidneys was defined; it was found that they were the chief organs for the excre-

tion of the end-products of protein metabolism. It can be readily understood that when these organs are given not only their own work but that of the other organs to perform, unless the food requiring the greatest amount of effort on the part of the kidneys is confined to those types which can be most easily taken care of, such as milk, the kidneys stand a great chance of becoming impaired. Such is the case in nephritis.

Convalescent Treatment.—The return to normal diet must be made with the greatest caution. Specimens of urine must be taken often, for in this way alone can the development of nephritis be reckoned with.[6] Should nephritis develop in spite of efforts to prevent it, a lacto-farinaceous diet[7] such as is given in these conditions must be resorted to.

After three weeks, if the patient shows no disposition toward nephritis, and if convalescence is progressing satisfactorily, the diet may be increased day by day, adding milk toast, cereals, cream soups, rice, baked potato, then custards and soft eggs, the soft part of oysters, broiled or baked fish, broiled breast of chicken, and, still later, rare beef and lamb chops. Meat, however, must not be given until all danger from nephritis has passed.

DIPHTHERIA

The feeding in diphtheria follows the régime given in acute fevers. The body must be kept in good condition. At the same time it is necessary to understand the complications which make the dietetic treatment of this disease assume a place of importance.

Complications.—It may be complicated by broncho-pneumonia, albuminuria, carditis, endocarditis, and dilatation of the heart. Anemia must be combated, but care should

[6] See chapter on Urinalysis, p. 386.
[7] Consisting of cereal gruels, rice, and other starchy foods.

be used not to push the diet to such an extent as to impose too great a tax upon the already weakened heart.

Dietetic Treatment.—While the fever lasts the diet must be fluid, milk, buttermilk, malted milk, and some of the proprietary infant foods such as Mellin's Food, Eskay's Food, and like preparations. Milk gruels, made with milk and some cereal such as farina, barley flour, fine cornmeal, arrowroot, strained oatmeal, etc., are at times more easily swallowed than the unthickened liquids. Liquid beef peptonoids, panopeptone, and like predigested beef preparations prove valuable in many cases.

Convalescent Diet.—As convalescence progresses, or in cases where the patient finds it easier to swallow a semi-solid than a liquid, soft custards, gelatin, well-cooked cereals, and ice cream may be given. Eggnog and milk punch are at times given, but only upon the advice of the physician in charge.

Rectal Feeding.—When the condition of the patient makes it necessary to nourish in other ways than by mouth, nutrient enemas [8] may be given. In certain cases of diphtheria, young infants can be fed more successfully through a tube inserted by way of the nose into the stomach than by feeding in the ordinary way. The formula is prepared in the same way as for bottle feeding, and is poured into a glass funnel and through the soft rubber catheter into the stomach. Care must be observed to prevent the patient struggling on account of the heart weakness which invariably complicates this disease.

WHOOPING COUGH

In the early months of life it is probable that whooping cough is one of, if not the most fatal of the diseases to which the infant is subjected. The period of incubation of this disease is from one to two weeks, the cough at first not appearing different from those accompanying colds of all

[8] See Nutrient Enemas, p. 141.

sorts. However, in from ten days to two weeks the characteristic whoop occurs, differentiating this disease from all others. The symptoms aside from the whoop are the difficulty of taking breath and the great prostration after the paroxysm and the frequent vomiting of the food, brought on by the violent coughing.

In very young infants the whoop does not always occur. But the child coughs and holds its breath until it is blue in the face. At times young babies may have convulsions. The so-called spasmodic stage, during which the child may have from a few to a great number of paroxysms of coughing a day, lasts from a month to six weeks, and in some cases even longer. As the disease declines the cough gradually disappears and the child appears to be suffering with ordinary bronchitis. The characteristic whoop may return at any time during the ensuing six months or year if the child has an attack of bronchitis and is inclined to cough.

Complications and After-effects—The complications and after-effects of whooping cough give it a serious character. Hemorrhage may occur from the nose. According to Ruhräh: "Paralysis may follow from meningeal hemorrhage, broncho-pneumonia, acute empysema, and collapse of the lung may occur. Diarrhea, convulsions, and albuminuria are also met with. Tuberculosis and chronic bronchitis may follow." [9]

Dietetic Treatment.—The diet plays an important part in whooping cough. The serious complications and after-effects of this disease upon children necessitate a rigid observance of dietary laws. With infants it is always best, when it is possible, to give breast milk. As this is the natural food it requires less effort on the part of the digestive apparatus to become available. It has been proved that even during the time when the baby is nursing the milk is projected in spurts into the duodenum without waiting to be attacked by digestive enzymes in the stomach, and

[9] "Diseases of Infants and Children," p. 326, by Ruhräh.

for this reason the breast-fed infant is more apt to be efficiently nourished than the artificially fed baby, who loses his dinner by vomiting before absorption has had a chance to occur.

Diet under Ten Years of Age. — For children under ten years, a fluid diet is necessary, at least in the beginning of the disease while there is a fever, and later, if the vomiting is persistent. Milk, buttermilk, koumiss, broths, albuminized beverages, and cereal gruels such as barley and oatmeal gruel and arrowroot gruel can be given. Later, if the fluids are retained, cream of wheat, farina, junket, soft custards, and soft-cooked eggs may be added. Care must be taken in giving toast, unless it is softened with milk or broth, for the crumbs may bring on a paroxysm of coughing and vomiting. The best results in feeding with whooping cough are obtained by giving the food in small quantities and oftener. A few ounces given every two hours are less apt to be vomited than a larger quantity. It is also easier for the child to take the small amount after an attack of coughing and vomiting than it would be for him to attempt a larger meal.

Use of Stimulants. — In many cases where weakness is great, it has been found advisable to add some stimulant to the diet. With infants this is best given in albumen water, a small amount of good brandy acting better than other stimulants. With young children some of the predigested liquid beef preparations, such as liquid peptonoids, are found valuable. These foods are given alternately with the other fluid foods.

Hygiene and Sanitation. — Infants and children suffering with whooping cough require plenty of fresh air and sunshine. They must be kept out of doors as much as possible and sleep in well-ventilated rooms or sleeping porches. They must be protected from drafts and excitement, and never allowed to become over-tired. In this way the anemia which so often results from prolonged attacks of whooping cough is in a measure held in check. At times it is found

necessary to give some kind of an iron tonic, but this comes under the jurisdiction of the physician instead of the nurse. When bad effects do occur in spite of all the care exercised during the attack of whooping cough, they must be accorded the treatment especially devised to meet the situation.

MEASLES

This is an acute, infectious disease characterized by a red eruption which appears on the fourth day. Measles is one of the most contagious of all the diseases of childhood. It may be acquired by direct contact with another case or by being in the room with a case. The infection may also be carried through the air and occasionally by a third person. Measles is more prevalent in the winter than in summer. In cities it often occurs in epidemics. The period of incubation is from ten days to three weeks, occurring generally at about two weeks after exposure.

The attack may begin with the child showing a languid attitude, complaining of headache. Then a cough develops, with nausea and fever at times. The fever is often high, reaching 104° F. on the second day. As a rule the fever gradually falls after the second day and becomes normal in almost a week. However, the temperature varies in different cases.

Complications.—Measles is not considered dangerous in itself, but the after-effects sometimes prove fatal. This is especially the case in broncho-pneumonia, which frequently develops during or after the attack.

The gastro-intestinal, as well as the respiratory, tract is attacked in measles, diarrhea being especially common. Very weak children have been known to develop gangrenous stomatitis; paralysis and tuberculosis [10] likewise develop in some cases as the direct result of measles.

Thus it is demonstrated that measles is not to be lightly treated. Even if it is not in itself fatal, the results of the

[10] "A Manual of Diseases of Children," p. 319, by Ruhräh.

disease are so dangerous that the care of the nurse is especially necessary. The great trouble is that so often a nurse is not in attendance and the child suffers through ignorance of the mother.

Dietetic Treatment. — The dietetic treatment of measles is important. For infants milk is the exclusive diet, the formula for bottle-fed babies having to be weakened on account of the catarrhal condition of the gastro-intestinal tract. For older children it is necessary to confine the diet to fluids as long as the fever lasts, and at times longer if the stomach gives evidence of digestional disturbances. Milk is the chief food, with milk soups, buttermilk, and koumiss used to vary the diet. Orangeade and lemonade may be given to allay thirst. A return to normal diet must be made gradually, giving cereal gruels, milk toast, and broth before the more solid articles of diet suitable to the age of the child. When there are complications they must be treated, as in whooping cough, according to their symptoms.

SUMMARY

Gastro-intestinal Disturbances are responsible for much of the fever manifested during infancy and childhood.

Infectious Diseases are all more or less accompanied by an elevation of temperature.

Incipient Diseases, especially tuberculosis and scurvy, may likewise cause a rise of temperature. The relief of either disease or the fever depends largely upon how quickly the conditions are discovered and the means instituted to overcome them.

Metabolism in Febrile Conditions of children, as well as of adults, is rapidly increased, hence the energy output is greater, and for this reason the fluid intake must be augmented in order to eliminate the toxic substances produced as a result of the rapid breaking down of the body tissues.

The Kidneys are more or less strained to eliminate the products of the increased metabolism and for this reason it

is especially necessary to adjust the diet in order to limit, as far as possible, the foods which add to the burden already imposed upon the organs of excretion.

The Skin is an organ of excretion which, under normal conditions, shares the work of the kidneys. In infectious conditions, accompanied by eruptions which more or less cover the entire surface of the body, this organ is temporarily out of commission, hence its work, as well as their own, must be accomplished by the kidneys.

Dietetic Treatment in the majority of infectious diseases may be divided into three periods: Starvation, Fluid Diet, and Convalescent Diet.

Starvation, during which time no food is given for twenty-four hours or longer, in order to allow the digestive apparatus to rest and to give time for any substance which may be causing the elevation of the temperature to pass from the body. This treatment is also wise because it furnishes an opportunity for the symptoms of the disease to manifest themselves; Fluid Diet, given when acute symptoms subside, and Convalescent Diet when danger from relapse is over.

Scarlet Fever is treated with two main ideas in view — preventing the development of nephritis and relieving the condition should it develop.

Dietetic Treatment is logically the only means of treating or relieving nephritis. For the first three weeks, during which time this complication is apt to develop, a milk diet is necessary. This may be in the form of whole milk, milk soups, malted milk, etc. At the end of this time, if there are still no symptoms of nephritis, a convalescent diet, beginning with cereals and soft toast and progressing through the simple digestible foods such as rice, baked potatoes, soft eggs, etc., may be given. This is continued until the patient is well on the road to recovery. Meat should not be added until practically all danger of nephritis is passed.

Nephritis. — If, during the course of the disease this com-

plication should develop, the treatment described for acute nephritis on page 411 should be immediately instituted.

Diphtheria. — Dangerous complications at times develop as a result of diphtheria, making the treatment of this disease of the utmost importance. Heart symptoms, pneumonia, albuminuria, and anemia are among the complications to be dreaded and combated.

Dietetic Treatment in diphtheria is most important. It consists of a fluid diet made up of milk, malted milk, or buttermilk. At times the condition of the throat makes a slightly thickened mixture more easily swallowed than one which is distinctly fluid in character, and for this purpose farina, arrowroot, or barley flour may be used.

Increasing the Diet. — As convalescence advances the semi-solids, soft toast, soft custards, gelatin, and cereals may be given. Should the heart show symptoms of being affected, the intake of fluid must be restricted.

Gavage and Rectal Feeding are at times necessary. Infants may be successfully fed by passing a small rubber tube through the nose into the stomach and administering the milk formula to which they are accustomed. Rectal feeding is likewise valuable in cases of extreme anemia accompanying diphtheria.

Care must be observed by the nurse in giving gavage to babies, since any struggling on the part of the child may result in death from heart disease.

Whooping Cough. — On account of the character of the disease and the proneness of the stomach to eject the food during paroxysms of coughing, dietary measures are more or less necessary in order to enable the child to receive sufficient food to cover his daily needs.

Complications. — Hemorrhage, pneumonia, albuminuria, diarrhea, and convulsions may occur during the disease, while tuberculosis and chronic bronchitis may follow as after-effects.

Dietetic Treatment. — Breast milk is by far the best food

for the baby, in this as in all conditions. In whooping cough the fact that this fluid leaves the stomach almost as soon as it enters lessens the chances of the baby losing its meal by vomiting it.

Older children do well with frequent small meals, since they are not so apt to give rise to pressure which brings on the paroxysms of coughing and vomiting. When the meal is vomited, a second should be given in order to keep the child from suffering from malnutrition.

Stimulation is found to be necessary in certain cases. Albumen water containing a spoonful of brandy or some of the prepared beef preparations, such as liquid peptonoids, may prove valuable under the circumstances.

Measles. — Complications and after-effects developing as a result of measles make the dietetic treatment of this disease important. Gastro-intestinal disturbances, especially diarrhea, are apt to occur, and tuberculosis has been known to develop as a result of measles.

Dietetic Treatment. — The fluid diet as used in any acute febrile condition is used as long as the temperature is elevated. Milk, buttermilk, malted milk, and milk soups constitute the chief items in the diet. Orangeade and lemonade are found valuable in relieving the thirst.

PROBLEMS

(*a*) List the evidences of errors in the diet of infants; show how they may be corrected in the formula.

(*b*) Outline the processes in the preparation of Eiweissmilch (protein or albumen milk). What constituent is particularly low in this milk, and how was its reduction accomplished?

CHAPTER XI

THE FEEDING OF ADULTS IN DISEASES OF THE GASTRO-INTESTINAL TRACT

ACUTE AND CHRONIC GASTRITIS

Predisposing Factors.—The majority of diseases affecting the stomach have as their predisposing factors, and owe their development to, one or all of the following conditions: (1) errors in diet; (2) disturbed secretory processes; (3) disturbed motility and tone.

It is probable that in the beginning the first factor was the chief offender in the case, bringing about the development of one or both of the other conditions. The other factors to be considered in this respect are heredity, occupation, poverty, and diseases which involve to a greater or lesser degree the digestion of the stomach and intestines. Errors in diet include the eating of the wrong food, too much or too little food, badly selected and prepared food, too little water, or milk, and a deficiency in the vitamin factors, especially of the "B" vitamin.

Disturbed Secretory Processes.—Consensus of opinion goes to show that the majority of cases of acute and chronic gastritis (catarrhal) and gastric ulceration are due primarily to a disturbance of the secretory processes, while the impaired motility and lack of tone in the stomach probably influence their development and aggravate the disease already present.

Composition of Gastric Juice.—In a former chapter the

processes of gastric digestion were explained. The gastric juice, composed of from 0.2 to 0.3 per cent free hydrochloric acid and several important enzymes and lipases, which act upon the proteins and emulsified fats, must be sufficient in quantity to assure good digestion, and when anything arises to interfere with the secretion of this fluid a deviation from the normal is bound to occur.

Disturbed Motility and Tone.—Again, it has been proved that good gastric digestion, like good intestinal digestion, depends more or less upon the way in which the food mass is mixed with the digestive juices and moved along the alimentary canal. Anything which interferes with the secretion of the juices or delays the food over its normal length of time in the stomach surely exerts unfavorable influences on the general metabolism of the food, for while, as we have already found, gastric digestion is not essential to the final utilization of the food in health, in disease it undoubtedly exerts a marked influence upon the general nutrition of the individual.

HYPOCHLORHYDRIA

The lack of hydrochloric acid in the gastric juice lowers the resistance to bacterial action, for this constituent exerts a decided germicidal influence in gastric digestion, preventing fermentation with the production of organic acids and probably alcohol. In conditions due to hypochlorhydria (lack of hydrochloric acid) foods which leave the stomach quickly must be given with enough of the other necessary constituents in their simplest and most easily digested form to balance the diet and prevent the occurrence of the other disorders as troublesome as the original disorder.

Dietetic Treatment.—The following points must be kept in mind in formulating a dietary for patients suffering from a deficiency of hydrochloric acid: (1) boil the drinking

water to destroy any bacteria which may be present; (2) use carbohydrates in the form of starch rather than sugar, since starch is less liable to fermentation from bacteria than sugar; (3) limit the foods which delay the passage of the food mass from the stomach; fats pass into the duodenum more slowly than other foods and when fed with other foods delay their passage materially; (4) avoid the use of soda bicarbonate, as it tends to reduce the normal acid content of the stomach, thus preventing its germicidal action upon the fermentative bacilli; alkaline carbonates likewise inhibit the flow of gastric juices; (5) give especial attention to the attractiveness of the food served; let it be appetizing and savory, for by such means is the appetite juice and incidentally an increased flow of the gastric juices stimulated; (6) condiments and spices, meat broths high in extractives, and salt foods such as caviar and endives may be given at the discretion of the physician; it is seldom advisable to give the foods which are indigestible, even when they act as stimulants to the secretory cells of the stomach.

Achylia Gastrica

HYPOCHLORHYDRIA

Sample Diet

Breakfast.

½ grapefruit or small glass of orange juice (little sugar).

Cereal, with small quantity thin cream, little if any sugar.

Soft cooked, poached or coddled egg.

Toast, ½ square butter.

Luncheon.

Vegetable soup or tomato bouillon.

Cottage cheese with small quantity thin cream, little if any sugar (salt and small amount of pepper preferred).
Baked potato.
Bread and ½ square butter (no fresh or hot bread).
Baked apple or apple sauce.
½ glass of orange juice.

Dinner.

Clear soup or tomato bouillon.
Very tender beef, chicken, lamb or fish (meat of questionable tenderness must be chopped).
Well cooked vegetable, no long fibered, coarse vegetables, peas and beans must be pressed through sieve (no dry beans allowed).
Fruit salad from canned fruit or orange and grapefruit, or cooked vegetable salad, mineral oil mayonnaise instead of olive oil if hypochlorhydria is pronounced.
Bread (stale), ½ square butter.
Simple dessert.

HYPERCHLORHYDRIA

(Excess secretion of acid in the stomach)

The Effect of Excess Acid.—An excessive flow of hydrochloric acid has been found to be the cause of much of the acute and chronic gastritis, in fact more of the cases are traceable to an excess than to a lack of hydrochloric acid. This acid is more or less irritating in character, and the tender mucous membranes lining the gastric organ being constantly bathed in a secretion composed chiefly of acid must necessarily in time suffer a certain amount of irritation and inflammation, causing the development of a pathological condition which may be temporary or permanent, that is, it may result in acute or chronic gastritis,

according to the amount of acid secreted and the length of time the hypersecretion is allowed to continue.

Determining the Acid Content of Stomach.—The difference between the cases brought about by an excess flow of hydrochloric acid are more or less difficult to distinguish from those caused by a lack of this constituent in the gastric juice, chiefly because in the latter case the organic acids formed as the result of bacterial action upon the food exert an equally irritating effect upon the membranes of the stomach, and the only sure method of determining the cause of the disturbance is by an analysis of the stomach contents, by which means the percentage of hydrochloric acid is determined.

Lavage.—It has been found advisable, in some cases of acute gastritis which do not yield readily to rest and liquid diet, to wash the stomach and allow a certain period of rest before giving any food; in this way the organ is rid of all of the offending material and thus has a better chance of a quick recovery.

The following menu shows ways in which the food may be introduced in cases of hyperchlorhydria:

HYPOCHLORHYDRIA

Sample Diet

Breakfast.

Fine cereals, with cream.
Soft cooked, poached or coddled egg.
Toast with butter.
Orange marmalade or fruit sauce in small quantities.
Cocoa or milk.

Luncheon.

Cream of spinach (or other bland cream soup).

Baked potato or macaroni and cheese (no Italian dressing).
Green peas, stewed celery, tender string beans, cauliflower or any non-irritating vegetable.
Bread and butter.
Apricot charlotte (stewed sifted apricots and whipped cream).
Milk or buttermilk.

Dinner.

Tender meat (chicken, lamb, beef, or omelet or fish).
Mashed potatoes or boiled rice.
One or two tender green vegetables.
Bread and butter.
Custard, apple tapioca or rice custard.
Milk or buttermilk.

As a rule in severe cases meat is omitted; meat juices and broths are likewise omitted.

Serve small meals, five rather than three meals per day, to avoid the stimulation caused by pressure.

Avoid stimulation of secretory cells in stomach by omitting from diet meat juices (extractives), meat soups or broth, salt foods, coarse foods, condiments, concentrated sweets, and extremes in hot or cold foods.

Use protein foods frequently to combine with acid in stomach, but select protein carefully to avoid those that stimulate.

The so-called "Bland Diet" provides the means for carrying out these directions.

Bland Diet

Strained oatmeal or other cooked cereals without bran, as cream of wheat.

Spaghetti, macaroni, creamed cottage cheese.

Toast, white bread. No hot bread unless ordered.

Soft puddings of all kinds such as custard, tapioca, blanc mange with jelly, gelatin jellies, etc.

Eggs: Poached, soft boiled, scrambled (with cream), and eggnog.

Mashed potatoes.

Vegetables: Only in the form of purée, as corn, carrot, pea, asparagus, bean.

Creamed soups, milk and cream, equal parts, t. i. d.

Coffee, tea, cocoa.

No salads or fried foods.

No frozen desserts unless ordered.

No fruit or fruit juice.

ACUTE GASTRITIS

Dietetic Treatment.—The following dietetic treatment for acute gastritis is advised: As the stomach is the chief seat of disturbance, all unnecessary work must be taken from this region for a certain period:

(1) That any obscure cause may manifest itself and the diagnosis may be rendered more accurately and more quickly.

(2) That by resting the organ the offending materials may pass out of the body and thus prevent further trouble.

Starvation Period.—Twenty-four hours of total abstinence from food may seem extreme, but as a rule in acute cases of gastritis it is the only sane and safe method of instituting a diet and thus beginning to overcome the cause of the disturbance. After the period of starvation the diet is begun with caution.

Fluid Diet.—Fluids should be given first in the form of well-skimmed broths, which may be reënforced with egg or cereal flours when the patient is very thin or anemic. But-

termilk, made with the Bulgarian cultures, koumiss and other fermented milk foods, liquid beef preparations such as peptonoids or panopepton, albumenized orange juice, cereal gruels treated with Taka diastase when it is found necessary, and peptonized milk. These may be given in from four to six ounces at a time, every two hours on the second day.

Increasing the Diet.—On the third day if the attack is slight the diet may be increased by adding toast, softened with peptonized milk, an ordinary serving (3 ounces) of farina, cream of wheat or rice, reënforced meat broth with two crackers, a cup of tea and a slice of toast, and one or two soft-cooked eggs. If the acute symptoms are still present on the third day, the diet advised for the second day must be continued until they disappear.

Convalescent Diet.—On the fifth day, if progress is satisfactory, lightly broiled chicken or a small piece of rare boiled beefsteak may be added to the diet and the meals reduced in number from six to four.

Relapse.—The patient must be warned against overeating or eating any of the articles which are known to cause an acute attack in his individual case, since one attack predisposes to another, and chronic gastritis may develop as the result of the continual gastric disturbance.

CHRONIC GASTRITIS

The treatment in chronic gastritis is very like that in the more acute form; that is, it must be combated by removing the cause. Lack of fresh air and exercise have much to do with the development of chronic gastritis, but even they combined with a judicious amount of rest would be wasted without a proper adjustment of the diet to cover the main points of the disturbance. As has already been mentioned, the cause may be a lack of gastric juice or

it may be an excess of it; it may be intensified by an *atonic* condition of the organ or from the food passing too quickly into the duodenum.

Test Meals.—As a rule it is not safe to make a snap diagnosis as to the cause of this disorder. Since in many instances the more serious disorders may be traced to a disregard for nature's danger signals, the physician as a rule advises a test meal, this meal consisting of a glass and a half of water or a cup or two of tea without cream or sugar and from one to two slices of toast or water rolls. In from three-fourths to one hour or longer this is removed from the stomach by means of a stomach pump and analyzed, the result of the chemical and bacterial analyses forming the basis for diagnosis. This meal is generally given in the morning before any other food has been eaten.[1]

Dietetic Treatment.—The foods constituting the diet in chronic gastritis must be of the simplest character and prepared in the simplest manner. No fried foods are permissible. Pastries, griddle cakes, rich puddings and sauces, candies, and alcoholic beverages must be omitted from the diet as well as the following articles of food: pork, veal, shellfish except oysters, sardines, canned meats and canned fish, highly seasoned and spiced dishes, twice-cooked meats, vinegar, pickles, olives, cold slaw, pickled beets, catsup, mustard, coarse fibered vegetables such as cabbage, old onions, old turnips, and cucumbers, strong tea, coffee, or chocolate, rich cream or dishes made entirely of cream. In cases of excessive acidity due to a hypersecretion of HCl the extractives of meat are contraindicated, hence all gravies and outside parts of roasted meat must be omitted or limited in the diet.

[1] It is also customary to give the patient a bismuth or barium meal in order that an X-ray and fluoroscopic examination may be made to determine the character and extent of the disturbance.

Rules Governing the Selection of Foods.—It is advisable in cases of chronic gastritis to avoid all foods that tend to irritate the mucous linings of the stomach or intestines; *therefore it is well to omit* whole cereals, whole-wheat bread, long-fibered meats, coarse-fibered vegetables and fruits (vegetables should be finely divided and in many cases puréed), raw foods such as salads in the beginning, or fruits with skins or long fibers such as raw apples and pineapple (except the juice), too hot or too cold foods.

Sample Menu

Breakfast.

Farina or cream of wheat with cream (little sugar).
Soft-cooked or poached egg.
Toast and butter.
Hot milk flavored with coffee or cocoa, or cereal coffee with cream and little sugar.
1 spoonful of marmalade or jelly.

Dinner.

Cream of pea soup.
Buttered carrots.
Baked custard or fruit gelatin with cream.
Bread (not hot).
Baked rice, or creamy rice.
Milk or tea.
Butter.

Supper.

Baked potato.
Puréed spinach.
Cornstarch or tapioca pudding.
Minced chicken on toast.

The following list of "Gas-forming Foods" is included here to facilitate the arranging of the daily menu. The physician will indicate the ones he desires omitted.

GAS-FORMING FOODS

All foods show a tendency to ferment and cause an evolution of gas in the presence of much liquid, allow little liquid with meals.

Vegetables.—Lettuce, garlic, radishes, cabbage, celery, turnips (especially old turnips); beans, *especially dried beans;* onions, green and red peppers, tomatoes, cucumbers, spinach.

Fruits.—Pineapple, melons (especially canteloupe), apples (except when cooked), raisins and berries. In some patients *orange, grapefruit and lemons.*

Eggs in all forms, especially fried and hard cooked.

Cheese.—All cheeses except cottage cheese should be avoided by individuals with a tendency to form gas.

Meats.—All long-fibered or tough meats.

Soups.—Meat broths, especially meat soups containing gas-forming vegetables. Cream soups may be taken unless made from gas-forming vegetables. (As a rule, if spinach is passed through a sieve it does not form gas as quickly as it does when served without sieving.)

Desserts.—All *gross sweet foods,* such as clear sugar, candy, jam, etc. Starchy foods will ferment and form gas if there is any irritation in the intestinal tract. Hence it is best not to give starchy desserts at such times.

Cellulose and Starchy Foods.—The presence of fiber (skins, seed and roughage of any sort such as is present in whole cereals, whole-wheat bread, cornbread, except pearled meal), has a tendency to interfere with the digestion of the starches in the intestinal tract, hence such foods should be eliminated.

Beverages.—Soda water, soft drinks (on account of their sugar content), coffee, and possibly cocoa will form gas readily in the stomach and intestinal tract.

Other Substances.—Condiments, spices, excessive hot or cold food, salt food in excess, uncooked foods.

GASTRIC ULCERATION

Gastric ulcer may develop without an apparent cause. As a rule, however, it manifests itself in individuals between the years of fifteen and forty, particularly after prolonged digestional disturbances, especially those accompanied by a hypersecretion of acid. As the disease progresses, anemia is more or less severe, adding difficulty to the feeding problem. Many of the symptoms are like those of chronic gastritis, such as pain. However, the character of this pain may be different, beginning soon after eating and radiating toward the back. This point may be affected by position. As a rule there is a tenderness over the seat of the ulcer. This is detected by palpation. Vomiting is one of the most general symptoms in gastric ulceration. This may begin from one to two hours after eating when the pain is at its height, or it may start as soon as food enters the stomach. As a rule the latter condition is found more often in very nervous women whose mental attitude affects the stomach to such an extent as to make it difficult to give them sufficient food to nourish them.

The motor and secretory processes are more or less impaired in the majority of gastric ulcer cases, the sources of injury being (1) the chemical action of the digestive juices, (2) the mechanical irritation from peristalsis and poorly selected food.

Excess Acid.—Hyperacidity is present in the majority of the cases, the percentage of HCl rising at times fifty per cent. or more.

The patient with gastric ulcer may recover entirely and never have a return of the trouble, but care and close attention are necessary, since the ulcers are apt to recur, at times a series of ulcers developing one after another. Death may occur from exhaustion or from perforation and peritonitis. Surgical intervention is as a rule necessary when the ulcers persist, as they generally develop at or near the pyloric opening; and the constant development of cicatricial tissue brings about an obstruction of the pylorus, which if not relieved would allow the patient to starve.

Diet Treatment.—The problem then is to find the means for reducing this injury; in other words, to arrange a diet which will give the secretory and motor processes the maximum amount of rest, at the same time providing for the maintenance of normal nutrition of the patient.

There has been a number of diets formulated with these points in view. Einhorn has provided a diet to be fed directly into the duodenum, thus eliminating all work on the part of the gastric organ. Sippi formulated a diet high in fat (cream) to be fed hourly by which means the flow of hydrochloric acid is depressed and the acid present in the stomach to be neutralized by means of alkaline powders, thus preventing the constant irritation of the ulcer. Lenhartz diet for gastric ulcer provides for the rest of the organ during the first week, but is brought back to what amounts to almost a normal diet after the first week. This diet, like that arranged by Dr. Sippi, is fed hourly.

The third diet scheme offered is that arranged by Dr. Warren Coleman. This diet contains fewer articles of food, and these are in their purest form (fat in form of olive oil or unsalted butter, carbohydrate in form of glucose, protein in white of egg, water and salt). The diet is administered by way of mouth and by rectum. The feeding intervals are

much longer than those of either of the other diets just mentioned.

The following outlines are included to facilitate the management of ulcer cases:

Einhorn's Duodenal Feeding Diet [2]

Purpose.

(1) To nourish patient.

(2) To rest the stomach.

Method.

All food is introduced into the duodenum by means of a tube. This tube is left in place throughout the entire period.

Length of Treatment.

The feeding by tube continues from 10 to 14 days.

Formula.

Milk, 240 c.c.
Raw egg, 1.
Sugar of milk, 15 grams.
Given every 2 hours, from 7 A.M. to 9 P.M.

Lenhartz Diet [3]

First Day.—200 c.c. milk and 2 eggs, given every hour from 7 A.M. to 9 P.M. The milk is increased 100 c.c. per day until 1,000 c.c. are taken each day; the eggs are increased at the rate of 1 per day until eight are taken per day.

Second Day.—300 c.c. milk, 3 eggs.

Third Day.—400 c.c. milk, 4 eggs, 20 grams sugar. The sugar is beaten into the egg and given in spoonfuls; the milk and the egg mixture must be kept very cold. The sugar is increased daily until on the ninth day 50 grams of sugar is being added to 4 raw eggs.

[2] Einhorn, Medical Record, 78: 92, 1910.
[3] Lenhartz, Deutsch. med Wehnschr., 30: 417, 1904.

On the *Sixth Day* 35 grams of scraped beef is added. Divide in three parts and give at the 9 A.M., 1 P.M. and 5 P.M. feedings. The beef is increased to 70 grams on the seventh day.

Seventh Day.—100 grams boiled rice is added. This amount is increased until 200 grams is taken on the tenth day.

Eighth Day.—40 grams zwieback or toast is added.

Tenth Day.—20 grams butter and 50 grams minced chicken are added.

After the sixth day part of the eggs are cooked until patient is taking 4 raw and 4 cooked eggs per day. Proportions of several foodstuffs are approximately 130 gm. protein, 75 gm. fat, 200 gm. carbohydrate on ninth day, with a calorie value of 2,051.

The eggs are beaten, placed on ice, and administered by spoon. The milk is also measured and given alternately with egg throughout day. When sugar is added to the diet, it is mixed with raw egg.

Sippi Diet (Routine)[4]

Consists of equal parts milk and cream given every hour from 7 A.M. to 9 P.M. 90 grams of mixture at each feeding throughout the first week.

Second Week.—In place of milk and cream feeding at 8 A.M. and 6 P.M. one of the following foods may be substituted:

1. 6 oz. well cooked cereal (bran free).
2. 6 oz. strained cream soup (flavored with vegetables).
3. 4 oz. baked custard.
5. 4 oz. junket.

[4] Sippi, Routine Diet: As administered in the Kaler Hospital, Mayo Clinic, Rochester, Minn. Courtesy of Miss M. Foley.

Third Week.—The noon milk feeding is omitted and the following foods added to the list already given:

1. Soft-cooked eggs.
2. Prune purée or apple sauce.
3. Blanc mange, sponge pudding, prune or apricot whip.
4. Ice cream once each week.

More than one food may be served at a feeding.

Example:

8 A.M. 6 oz. cereal.
3 oz. cream.
1 teaspoon sugar.

12 M. 6 oz. cream soup.
1 soft-cooked or poached egg.

6 P.M. 4 oz. boiled or creamed rice.
2 oz. cream, 1 teaspoon sugar.
4 oz. strained apple sauce.

Fourth Week.—The following foods may be added to those allowed in third week.

1. Finely ground or puréed vegetables such as peas, spinach or asparagus.
2. Baked potato.
3. Pared and cored baked apple.
4. Milk toast.
5. Zwieback or dry toast.
6. Plain gelatin or jello with whipped cream.

Example.

8 A.M. Puréed prunes.
6 oz. cream of wheat.
3 oz. cream.
1 teaspoon sugar.

1 soft-cooked egg (poached).
1 slice toast or zwieback.

12 M. 6 oz. cream soup.
1 medium baked potato.
1 square butter (10 grams).
1 serving sieved or puréed spinach.
1 slice toast or zwieback.
Soft custard or blanc mange.

6 P.M. Milk toast.
Poached or soft-cooked egg.
Baked apple.

When patients become toxic on the Sippi diet, a diet administered at two-hour intervals and containing orange juice, malted milk, eggnog is given in addition to the foods already mentioned.

During the dietary treatment alkaline powders are administered. These powders consist of: No. 1, Sodium Bicarbonate, gr., X. Calcined Magnesia, gr., X, every 2 hours from 7.30 A.M. to 7.30 P.M. No. 2, Sodium Bicarbonate, gr., XXX. Bismuth Subcarbonate, grs. X, every 2 hours from 8.30 A.M. to 8.30 P.M. The nurse administers the powders according to directions from the physician.

Preparing the Ulcer Tray.—Cover tray with clean napkin. On this tray place the following articles: 1 glass graduate for patient's use (3 ounce graduate); 1 medicine glass, 1 spoon (for use in taking powders); glass container filled with ice in which is placed the bottle filled with the cream and milk mixture; bottle filled with cream and milk mixture mixed according to the amount of cream and milk allowed for that day (first, proportion of one-half ounce 40% cream and one-half ounce whole milk, and changing the proportion of cream and milk in the bottle according to directions). Card showing patient exact amount of cream and

milk mixture to take and the hour it is to be taken. Care must be taken to have the supply of milk and cream always ready; the supply is renewed in the bottle as needed. The ice should be renewed frequently in the container surrounding the bottle of cream and milk mixture. *This tray must be kept scrupulously clean.*

Coleman's Diet for Peptic Ulcer.[5]—Fat must be depended upon to furnish the greater part of the energy of the diet.

Protein.—White of egg when given alone or with small quantities of water or lightly boiled does not excite gastric secretion; white of egg is therefore selected to furnish the protein of the ulcer diet. The amount of nitrogen need only slightly exceed the nitrogen minimum, that is, from 3 to 5 grams per day. This amount is provided by the whites of from 6 to 8 eggs.

Carbohydrates.—Pure carbohydrates, such as sugars, are apt to undergo fermentation in the stomach. Cereals are combinations of both starch and protein; their digestion is difficult and prolonged. For these reasons it is desirable to give no carbohydrates by mouth, but to give glucose by rectum. Glucose is readily absorbed from the large intestine, but it has been found expedient not to give more than from 90 to 100 grams per day.

Salt.—Sodium chloride is added to glucose enemas to prevent loss of chlorine from the body.

Water.—The greater portion of the water required may be given by rectum. If thirst is not controlled by the enemas, moderate quantities may be allowed by mouth whenever desired. Water excites gastric secretion only when given in large amounts at a time.

In order to secure complete rest for the stomach, only

[5] Coleman, Warren, Jour. Am. Med. Assn., Sept. 20, 1924, Vol. 83, pp. 885-888. Courtesy Dr. Coleman.

water is permitted by mouth for several days. In the early part of the treatment, both in the preliminary period and after feeding by mouth is begun, the patient does not receive the amount of food he needs; but when the totals of the various foods have been reached, the nutritive requirements of the body are completely covered. Thus: Five ounces (150 c.c.) of olive oil or 6 ounces (180 gms.) of butter furnish approximately 1,400 calories.

The whites of 8 eggs contain 33 gm. of protein (5 gm. nitrogen), and furnish 135 calories.

Four ounces (120 gm. of glucose) furnish 480 calories.

Eight grams of salt will prevent loss of chlorine from the body.

Procedure.—The patient is put to bed to minimize the effect of exercise on gastric motility, to lower his metabolism, and to assist in retaining the enemas. Before the treatment is begun the alimentary tract is cleared with castor oil or some other laxative.

For from three to five days, depending on the ability of the patient to withstand partial starvation, no food whatever is given by mouth. If this is not controlled by enemas, small quantities of water, from 1 to 3 ounces (30 to 90 c.c.), at room temperature or warmed may be allowed whenever desired. Cracked ice may be held in the mouth unless the water that is swallowed provokes pyloric spasm.

The Enemas.—The glucose enemas are begun on the first day of treatment. They consist of glucose (30 gm.) in 300 c.c. of physiologic sodium chloride solution. Each morning, before the first nutrient enema, the rectum and sigmoid should be emptied by an enema of soapsuds or sodium chloride solution (0.7 per cent.). The glucose solution is given, hot, from a vacuum bottle by the drip method at a rate that consumes from a half to three-quarters of an hour. Three or four such enemas are given daily, equally spaced throughout the sixteen waking hours.

Experience has taught that the average patient readily tolerates a 10 per cent. solution; a few patients are able to retain a 12 per cent. solution; in some, the strength must be reduced to 7 per cent. Intolerance of the enema manifests itself in painful intestinal cramps, though the solution is not always immediately expelled. When cramps occur, the strength of the solution must be reduced, or the number of enemas restricted. The enemas are continued throughout the treatment.

Food by Mouth.—On the fourth to sixth day feeding by mouth is begun. The only foods permitted are white of egg and olive oil or butter fat. The schedule of feedings are arranged so that the egg white and olive oil or butter fat are given at different hours, in order that the fat may not delay the passage of albumin from the stomach. The intervals between feedings should be as long as may be feasible; they should not be less than two hours. The total quantity of food should be increased as rapidly as the stomach can take care of it in order to control the loss of weight. The total amount given at any feeding need never exceed 3 ounces (90 gm.); it does not always reach that.

From 1½ to 2½ ounces (45 to 75 c.c.) of olive oil may be given the first day, given clear and chilled. The whites of from 3 to 4 eggs may be given the first day, throughly mixed with a small quantity of water or whipped into a foam or lightly coddled; a pinch of salt may be added. As the treatment progresses the quantity of oil is increased to the maximum of 150 c.c. (5 oz.) and the whites of eggs to a total of 6 or 8.

Olive oil palls upon the taste of some patients and must be replaced by some other fat; unsalted butter may be employed in corresponding amounts. It must be very fresh, otherwise wash several times. The butter may be melted or cold and a pinch of salt may be added before taking.

For sake of variety, yolk of egg may be substituted for

a portion of the oil or butter fat, one yolk to about one teaspoonful of oil or butter. The white and the yolk must not be given together. The yolk may be heated through, but not cooked hard. A little sweet butter and salt may be added.

This diet should be continued for from three to four weeks, and, as after other diet cures, only specially selected food should be allowed for many months.

Anemia.—When anemia is severe, as is often the case in gastric ulceration, the diet must be reënforced to overcome it. Some of the concentrated milk foods such as casec, malted milk, whole milk powder, etc., as well as the predigested meat foods, such as panopepton, liquid beef peptonoids, and like preparations, may be used to reënforce the diet.

Lavage.—When lavage is necessary the patient must be allowed to rest after the process before being given food, otherwise it is apt to be vomited.

Instructions to Nurse.—The treatment for gastric ulceration is thus seen to be strenuous. In the beginning the patient is placed on a liquid or semi-solid diet, or is not fed at all for a time. This is done that the diseased organ may have a chance to adjust itself as far as possible and to give the physician an opportunity of studying the changes taking place in that organ. During the course of the disease the general symptoms which develop from time to time, causing more or less pain and discomfort to the patient, are nervousness, which in some individuals amounts to melancholia, extreme anemia and an utter distaste for food, all of which require patience on the part of the physician, the nurse, and the patient herself to overcome. The nurse must see that the patient is not disturbed or made unhappy by having business or home cares talked over in her presence; she must be kept as cheerful and as comfortable as her condition permits and urged to use care in her diet. After the ulcer is healed, to prevent a return of the trouble she must

be warned against eating too fast or when over-tired, and she must be advised against very hot and highly seasoned foods, for, in the observance of these simple common-sense precautions only is she even in a measure saved further attacks.

It has been found, in many cases of gastric ulceration, especially those accompanied by hemorrhage, that glucose gives better results when used in rectal alimentation than any other substance. The strength of the solution varies from a five to a ten per cent. solution. The number of glucose enemas given each day must be regulated by the physician. The method used is the same as in other rectal feedings, the enema is given "high," and the flow regulated (drip-method).

GASTRIC CANCER

As a rule the seat of the gastric cancer is the pylorus. The patient gives evidence of chronic gastritis with continued pain, localized tenderness, vomiting of partially digested food and at times dilatation from extreme fermentation. The hemorrhages are as a rule not large, the blood having changed to a brownish color resembling coffee grounds. Vomiting, in cases where the pylorus is involved, generally occurs several hours after eating, the vomitus being in an advanced state of fermentation. Upon analysis of the stomach contents there is found to be a lack of free HCl.

Dietetic Treatment.—In the dietetic treatment of cancer of the stomach the most digestible forms of foods must be given, milk forming in this, as in other gastric disorders, the chief article of diet. As too much food cannot be tolerated, the meals must be small, even if given more frequently. The patient is often found to evince a distaste for meat, in which case fish may be substituted. When meat is given, it must be simple in form and preparation,

such as boiled or broiled sweetbreads or brains, scraped beef or stewed chicken. Rice, farina, cornmeal mush, and other fine cereals, cooked with or without milk, are valuable additions to the diet. Well-cooked and strained spinach, green peas, cauliflower, carrots, and tender string beans and boiled or baked potatoes well mashed may be recommended. Tea, coffee, or cocoa may be used to flavor the milk. These must be given in small portions. The following diet list is recommended by Friedenwald and Ruhräh:

		Calories
8 A.M.	100 grams of milk with tea	100.0
	30 grams of milk toast	130.0
10 A.M.	100 grams of baked trout	106.0
	100 grams of milk or 30 grams panopepton (57.5)	67.0
	10 grams of butter	81.0
	50 grams of toast	130.0
	50 grams of sherry	60.0
12 M.	Bouillon with 5 grams somatose	16.0
	100 grams of chicken	106.0
	or 100 grams squab (100)	
	or 100 grams of calves' sweetbreads (90)	
	or 100 grams of calves' brains (140)	
	60 grams of macaroni	212.0
	or 100 grams of mashed potatoes	127.0
	or 100 grams of spinach (166)	
	or 100 grams of asparagus (18)	
	25 grams of stale wheat bread	65.0
4 P.M.	20 grams of toast	130.0
	20 grams of butter	162.0
	40 grams of caviar	52.0
7 P.M.	130 grams of milk (100) with 5 grams somatose (16)	116.0
	100 grams of rice cooked in milk	177.0
	50 grams of wheat bread	130.0
9 P.M.	30 grams of panopepton	57.5
		2024.5

SUMMARY

FACTORS INDUCING GASTRIC DISTURBANCES

1. **Errors in Diet.**—Overfeeding, underfeeding, improper food, unbalanced diet.

2. **Disturbed Secretory Processes.**—(*a*) Over- or under-secretion of gastric juice.

(*b*) An excess or deficiency of hydrochloric acid in the juices.

3. **Impaired Motility and Tone of the Gastric Organ.**—The peristaltic waves and muscular contraction of the stomach walls becoming sluggish prevent the food mass from passing into the intestines at a normal rate of speed, thus giving rise to a fermentation of the food and a consequent dilatation of the organ from the gas thus produced.

Other Factors.—Lack of fresh air and exercise, indoor occupation, bad hygiene, unsanitary surroundings, heredity, certain diseases which are accompanied by gastric disorders.

Diseases of Gastric Organ.—Acute and Chronic Gastritis, Gastric-Ulceration, Gastric Cancer.

Treatment.—Tests—Test meals, X-ray examinations (pictures and Fluoroscope). Patient is given no breakfast on day of test. In X-ray laboratory a bismuth or barium meal is given, this meal consists of a pint of fluid, either buttermilk or malted milk, into which a certain amount of bismuth or barium chloride is mixed.

Starvation Period.—A period of abstinence from food is instituted in most of the gastric disorders, (*a*) to determine the extent and character of the disease, (*b*) to rest the digestive tract.

Dietetic Treatment.—Diet adjusted to meet the needs of the individual case as determined by the medical examination.

Instruction to Patient.—Individual warned against overeating, drinking and constipation.

PROBLEMS

(*a*) Formulate a diet order for a patient suffering from chronic gastritis. (Individual's food requirements must be observed.)

(*b*) Formulate a diet for gastric ulceration. List the available foods; the avoidable foods.

(*c*) Outline a diet to be used in case of gastric cancer; show how it differs from the one used in gastric ulceration.

CHAPTER XII

DISEASES OF THE INTESTINAL TRACT—DIARRHEA, APPENDICITIS, CONSTIPATION

DIARRHEA

Definition.—Diarrhea is more of a symptom than a disease in itself, but the condition is manifested by a too rapid passage of the food mass down the intestinal tract.

Cause.—There are various causes for the irritation of the linings of the intestinal walls, which give rise to the too frequent and too liquid stools, occurring in this condition. Many diseases have diarrhea as a prominent symptom. In others diarrhea is a frequent complication. The stools may be watery from a loss of water from the intestinal walls. The condition may be caused from overeating or the eating of the wrong food. The taking of purgatives may lead to both chronic diarrhea and to a certain type of constipation. Bacterial action, either of the fermentative types (acting chiefly upon the starches in the intestines, or putrefactive type, caused by the action of putrefactive bacteria upon the unabsorbed protein. Typhoid fever, pellagra, amebic dysentery, achylia gastrica (or hypomotility in the gastric organ) may all account for diarrhea.

The treatment must be directed (1) to removing the cause of the irritation of the mucous membranes of the intestinal walls, (2) adjusting the diet, (3) correcting the dietetic errors, (4) restoring the tone to the muscles. The following diets are used in the treatment of some of the best known and most frequent types of diarrhea, together with the test diet recommended by Schmidt for determining the type of the disturbance.

Some of the foods that cause trouble in those conditions are those that easily ferment and give rise to a gas formation, since peristalsis may be stimulated by chemical and mechanical means, it is not advisable to overlook any of the means for preventing its development.

Easily Fermented Foods or Foods That Form Gas in Stomach

In Stomach.—Gross sweets, such as sugars; sugar products such as candy, jams, jellies, etc., sweet desserts; raw foods, such as salad vegetables, which may bring in bacteria of a fermentative type; tea and coffee, especially if sweetened with sugar.

In Intestinal Tract.—Starchy foods, especially those in which eggs and sugar are combined. Beans of all sorts, especially dried beans. Cabbage, spinach, kale, greens, celery. Molasses, honey, eggs. Long-fibered meats.

Any food which has a tendency to irritate the mucous lining of the stomach, or intestinal tract may give rise to an evolution of gas.

The presence of ulcers cause gas, hence when foods only mildly gas forming in character are eaten the gas formation is likely to be increased.

Schmidt Intestinal Test Diet [1]

Principles:

Easily digested foods, balanced diet, low residue.

Indications:

Diagnostic, for diarrhea, therapeutic, for fermentative diarrhea.

Breakfast

	P.	*F.*	*C.*	*Cal.*
Milk, 1 pint (450 c.c.) (or tea or cocoa with milk)	14.8	18.0	22.5	319
Vienna roll (45 gm.)	3.8	1.0	25.4	129
Butter, 7½ gm.	0.	6.3	0.	59
Egg, 1 soft-boiled	6.6	6.0	0.	83

[1] The Schmidt Intestinal Test Diet is copied directly from Modern Hospital, Vol. XXVIII, No. 1, page 138. Courtesy of Modern Hospital Publishing Co. and Harry Gauss, M.S., M.D.

		P.	*F.*	*C.*	*Cal.*
10 A.M.	Thick oatmeal soup, 150 c.c, strained, cooked with milk	13.1	12.1	32.7	300
	Sugar, 7 gm.	0.	0.	7.0	29
	DINNER				
	Cream of potato soup, 125 c.c.	2.9	9.0	9.6	135
	Beef, scraped, quarter of pound (115 gm.) slightly browned in pan	25.0	12.2	0.	216
4 P.M.	Milk, 1 pint, 450 c.c.	14.8	18.	22.5	319
	Vienna roll, one	3.8	1.0	25.4	129
	Butter, 7½ gm.	0.	6.3	0.	59
	SUPPER				
	Thick oatmeal soup, 150 c.c., strained, cooked with milk	13.1	12.1	32.7	300
	Sugar, 7 gm.	0.	0.	7.0	29
	Eggs, soft boiled, 2	13.1	12.1	0.	166
	Vienna roll, one	3.8	1.0	25.4	129
	Butter, 7½ gm.	0.	6.3	0.	59

The figures are somewhat different in the above diet than those mentioned in other parts of the text due to different fuel factors being used.

ACUTE ENTERITIS

The Bowels.—The symptoms of this condition are too liquid or too frequent stools, the number varying from three to twelve or more a day. They may be greenish yellow in color and contain particles of undigested food and mucus. In prolonged diarrheal attacks the stools sometimes contain blood.

The attack may be accompanied by more or less pain of a colicky nature, due to the formation of gas in the intestinal tract. In ptomaine poisoning this pain is sometimes very intense. As a rule the intestinal tract is emptied by means of salt, oil, etc., but this is generally directed by the physician. A soapsuds or salts and glycerin enema to flush the colon will often give quick relief by dispelling the gas.

Starvation.—The entire digestive tract requires absolute rest for a certain period; no food and very little water, the latter in the form of bits of ice only, are given for a period lasting from twelve to thirty-six hours or more, depending upon the violence of the attack and the condition of the patient. This is to allow the toxic substances which

are probably causing the disturbance to pass out of the body, either in the feces or in the urine. When the acute symptoms subside, that is, when the pain and distention of the intestines have disappeared, and the bowel movements become more normal in number and character, the dietetic treatment suitable to the condition is instituted.

Dietetic Treatment.—The first day the patient is given a small cup of weak tea, half a glass of buttermilk or peptonized milk, or a cup of well-skimmed meat broth, every three or four hours. If the patient is weak, the nourishment may be given oftener. Whole milk, unless it is peptonized, and at times even then, is not advisable in diarrheal conditions on account of its liability to form curds which decompose with the production of toxic substances, known to be exceedingly irritating to the already inflamed mucous membranes lining the intestinal walls.

Increasing the Diet.—As the diarrhea and inflammation subside, the following foods are gradually introduced into the dietary, keeping in mind always that a return of the acute symptoms is apt to occur. Hence the patient must never be overfed. It is better to err on the side of too little than too much food during the early convalescent period.

Diet.—Soft-cooked eggs, toast (slightly buttered), cocoa made with water instead of milk, chicken, calf's foot or wine jelly; later, well-cooked rice, junket, and soft custard; still later, lightly broiled beefsteak, lamb chops, chicken, squab or quail, sweetbreads or brains. Not until the patient is entirely free from all symptoms of diarrhea or intestinal disturbance may the following foods be given: cream or cream dishes such as cream toast, cream chicken, or cream soup, raw or stewed fruit, green vegetables, salt foods, spiced foods of any description, pastries, confectionery and desserts in general, unless they are simple in character and are sweetened with saccharin instead of sugar, as the latter substance is particularly susceptible to fermentation.

Fermentative Diarrhea [2]

Principles:

First Stage, intestinal rest.
Second Stage, minimum carbohydrate diet.
Third Stage, restoration of carbohydrates.

Indications:

Fermentative Diarrhea.

Contraindications:

Mixed type diarrhea.

First Stage

First Two Days (time is variable)

8 A.M.	Weak tea, no sugar or milk
10 A.M.	Clear broth
12 M.	Weak tea
3 P.M.	Clear broth
6 P.M.	Weak tea
9 P.M.	Clear broth

Second Stage

Third to Sixth Day

		Wt. Gm.	*Prot. Gm.*	*Fat. Gm.*	*Coh. Gm.*
8 A.M.	Protein milk	220	7	6	3
	Soft boiled eggs, 2	100	13	12	0
	Weak coffee (plain)	0	0	0	0
10 A.M.	Clear broth	0	0	0	0
	Cottage cheese	50	11	1	2
12 M.	Clear broth	0	0	0	0
	Roast Beef (med. fat.)	50	10	9	0
	Gelatin[3], no sugar	166	1	0	0
3 P.M.	Clear broth	0	0	0	0
6 P.M.	Clear broth	0	0	0	0
	Scrambled eggs (2)	100	13	12	0
	Butter	15	0	13	0
	Chicken, finely chopped	50	11	1	0
	Cottage cheese	50	11	1	2
9 P.M.	Protein milk	220	7	6	3
	Total Calories, 925		84	61	10

[2] Fermentative Diarrhea, Courtesy Dr. Harry Gauss, Denver, Colo., and Modern Hospital Publishing Co.

[3] *Raspberry Jelly.*—Gelatin, 8 gms.; cold water, 1 cup; boiling water, 3 cups; raspberry flavor, 2 tablespoons; saccharin, 1 grain. Soak gelatin in cold water for 5 minutes, add boiling water, raspberry flavoring and saccharin, put in a cold place to harden. This recipe makes six servings. Food value of recipe 7 grams (protein).

Third Stage

Seventh to Tenth Day (or Longer)

		Wt. Gm.	*Prot. Gm.*	*Fat. Gm.*	*Coh. Gm.*
8 A.M.	Orange, ½ small	50	.5	0	5
	Soft boiled eggs (2)	100	13	12	0
	White bread toasted, 1 slice	30	2	1	15
	Butter	7½	0	6	0
	Weak coffee	0	0	0	0
10 A.M.	Protein milk (or fermented milk, acidoliphus)	220	7	6	3
12 M.	Clear broth	0	0	0	0
	Roast beef	50	10	9	0
	Cottage cheese	50	11	1	2
	Puréed carrots	100	1	0	6
	Butter	7½	0	6	0
	Bread (white) 1 slice	27	2	0	14
	Cornstarch or tapioca pudding [4]	130	4	4	22.5
3 P.M.	Clear broth	0	0	0	0
6 P.M.	Clear broth	0	0	0	0
	Soft boiled eggs (2)	100	13	12	0
	Purée spinach	100	2	0	3
	White bread, 1 slice (toasted)	27	2	0	14
	Butter	7½	0	6	0
	Gelatin (no sugar)	166	1	0	0
9 P.M.	Protein or acidolphus milk	220	7	6	3
	Total Calories, 1271		75	69	87.5

Note: As a sequence to this treatment, the diarrhea may be followed by constipation; in that case the patient is placed on a high residue diet.

Protein milk (see page 140), or Acidoliphus milk, page 85.

The author of this text uses agar jelly and a mineral oil mayonnaise to combat the constipation following a fermentative diarrheal diet, but does not use bran bread or cereal on account of the danger of bringing on a return of the diarrheal condition.

Putrefactive Diarrhea Diet [5]

Principles:

First stage, intestinal rest.

Second stage, Minimum protein diet.

Third stage, restoration of protein.

Indications:

Putrefactive diarrhea, diarrhea of achylia gastrica, mucous colitis.

[4] The author substitutes cornstarch or tapioca pudding recipe as follows: Cornstarch or tapioca, 10 grams; sugar, 7½ grams; milk, 120 c.c.

[5] Courtesy Dr. Harry Gauss, Denver, Colo.

Contraindications:
Diabetes, fermentative diarrhea.

First Stage

One to Three Days (time is variable)

8 A.M.	Weak tea, no sugar or milk, 220 c.c.
12 M.	Weak tea, 220 c.c.
3 P.M.	Clear broth, 220 c.c.
6 P.M.	Weak tea, 220 c.c.
9 P.M.	Clear broth, 220 c.c.

Second Stage

Third to Fifth Days

		P.	F.	C.	Cal.
8 A.M.	Weak tea, no sugar or milk	0	0	0	0
	Arrowroot gruel,				
	Arrowroot, 50 gms.	0	0	49	196
	Sugar, 2 gms.	0	0	2	8
	Milk, 100 c.c.	3	4	5	68
	Salt, 1 gm.	0	0	0	0
10 A.M.	Boiled rice, 100 gms.	2	0	18	80
	Sugar, 2 gms.	0	0	2	8
	Milk, 60 c.c.	2	2	3	38
	Clear broth, 220 c.c.	0	0	0	0
12 M.	Cornstarch or tapioca pudding,				
	Corn starch or tapioca, 10 gms.	0	0	9	36
	Sugar, 7½ gms.	0	0	7.5	30
	Milk, 120 c.c.	4	4	6	76
	Weak tea	0	0	0	0
3 P.M.	Weak tea, 220 c.c.	0	0	0	0
	Arrowroot (or tapioca) gruel	3	4	56	272
6 P.M.	Clear broth, 220 c.c.	0	0	0	0
	Boiled rice, miyk and sugar	4	2	23	126
9 P.M.	Clear broth, 220 c.c.	0	0	0	0
	Cornstarch (or tapioca) pudding	4	4	22.5	142
		22	20	203	1080

Note: The order may be varied to relieve the monotony and flavoring agents may be added as chocolate, vanilla, etc.

Sixth to Ninth Day

		P.	F.	C.	Cal.
8 A.M.	Arrowroot (or tapioca) gruel	3	4	56	272
	Weak tea	0	0	0	0
	Puréed carrots, 100 gms.	1	0	9	40
	Butter, 7½ gms.	0	6	0	54
10 A.M.	Boiled rice, cream and sugar	2.5	2.5	33.5	166
	Clear broth	0	0	0	0
12 M.	Corn starch (or tapioca) pudding	4	4	22.5	142
	Baked squash, 100 gms.	1	0	9	40
	Weak tea	0	0	0	0

		P.	F.	C.	Cal.
3 P.M.	Clear broth	0	0	0	0
	Arrowroot (or tapioca) gruel	3	4	56	272
6 P.M.	Boiled rice, cream and sugar	2.5	2.5	33.5	166
	Mashed potatoes, cr'md, 100 gms.	3	0	21	96
	Weak tea	0	0	0	0
9 P.M.	Cornstarch (or tapioca) pudding	4	4	22.5	142
	Clear broth	0	0	0	0
		24	27	263	1390

Third Stage
Tenth to Fourteenth Day

		P.	F.	C.	Cal.
8 A.M.	Orange, one, 50 gms.	0	0	6	24
	Arrowroot (or tapioca) gruel	3	4	56	272
	White bread, 2 slices, 53 gms.	5.3	0	29	137
	Butter, 15 gms.	0	13	0	117
	Weak tea	0	0	0	0
10 A.M.	Clear broth	0	0	0	0
12 M..	Clear broth	0	0	0	0
	Boiled breast of chicken, 50 gms.	13	1	0	61
	Mashed potatoes, creamed, 100 gms.	3	0	21	96
	Puréed carrots, 100 gms.	1	0	9	40
	Corn starch (or tapioca) pudding	4	4	22.5	142
	White bread, 2 slices, 53 gms.	5.3	0	29	137
	Butter, 15 gms.	0	13	0	117
3 P.M.	Weak tea	0	0	0	0
6 P.M.	Clear broth	0	0	0	0
	Soft boiled egg, one	7	5	0	73
	Cottage cheese, 50 gms.	11	1	1.6	59
	Baked Squash, 100 gms.	1	0	9	40
	Boiled rice, milk and sugar	4	2	23	126
	White bread, 2 slices, 53 gms.	5.3	0	29	137
	Butter, 15 gms.	0	13	0	117
9 P.M.	Cornstarch (or tapioca) pudding	4	4	22.5	142
		66.9	60	257.6	1838

NOTE: After the diarrhea is under control, it is sometimes followed by constipation; the high residue diet may then be given.

CHRONIC ENTERITIS

The Stools.—When the diarrhea is chronic in character, the character of the stools indicates the seat of the inflammation. When there is a great deal of undigested food found in them the upper part of the bowel is more affected; when the stools contain more mucus than food the lower bowel is the chief seat of the trouble. The frequency and fluidity of the stools impose a great strain upon

the entire body, causing a progressive emaciation and anemia.

The treatment is similar to that instituted in acute attacks. The starvation régime cannot be carried out for a long period. Efforts must be made to ascertain the cause of the trouble and to overcome it. This is, as a rule, more easily accomplished with adults than with infants and children.

Dietetic Treatment.—The diet is the chief point of observation and attention. The same care must be observed as is found necessary in the after-treatment of acute diarrhea. The patient must be cautioned not to eat indigestible foods or those which are known to cause trouble in this respect. She must be warned against eating when over-tired.

ACUTE DYSENTERY

Dysentery is a disease in which the seat of inflammation is the colon. The bowels are distended and tender, the pain at times is acute and spasmodic, and the fever moderate. The constant desire to defecate and the straining which accompanies each effort, as well as the small stools, containing both blood and mucus, furnish the characteristic symptoms of this disease. Rest in bed is absolutely necessary; the patient must be induced to use a bedpan.

Dietetic Treatment.—The diet consists entirely of liquids as in acute diarrhea, the same careful régime being observed as in those conditions. The soreness in the abdomen is at times relieved by hot turpentine stupes.

CHRONIC DYSENTERY

When the above conditions become chronic, the patient loses weight and strength rapidly, becomes anemic and emaciated. The treatment, like that used in the acute disease, consists of rest and liquid diet. The medicinal treatment is left entirely in the hands of the physician.

APPENDICITIS

Appendicitis is an inflammation of the vermiform appendix. It may be acute or chronic in form.

Symptoms.—The disease is manifested by sudden pain in the right side, tenderness over the seat of the inflammation, and a localized rigidity of the right iliac fossa. The attack is as a rule accompanied by fever which may run as high as 103° or 104° F. The patient may suffer from nausea and vomiting. Constipation is generally an annoying symptom of the disease.

Rest in Bed.—The treatment of the acute attack consists of total abstinence from food for twelve or more hours until the most acute stage has passed and the patient either passes into the hands of the surgeon or the symptoms begin to subside in violence. It is necessary that the patient be kept in bed, not being allowed to rise for anything. The nurse must make him understand that his recovery, possibly his very life, depends upon his absolute quiet during the early stages of the disease.

Dietetic Treatment.—When the first acute symptoms have passed, the diet must consist of fluids, well-skimmed meat broths, buttermilk, peptonized milk, albumen water or albumenized orange juice. No solid food must be given until the acute symptoms have disappeared. When the tenderness in the right side has entirely left him and he no longer suffers the pain or nausea, a gradual return to a normal diet may be made. The patient must be cautioned against eating indigestible foods, as an attack of intestinal indigestion may readily start up an irritation in the susceptible appendix and cause a second attack of appendicitis which is often of a more serious nature than the first.

Convalescent Diet.—The return to solid food is made gradually as in other intestinal disorders, by giving the most digestible foods first. Soft toast, soft eggs, fine cereal gruels, well-cooked rice, well-baked white potatoes, meat, wine or

fruit jellies; then lightly broiled beefsteak, lamb chop, chicken, sweetbreads, or brains given in small quantities until the intestinal tract has regained its vigor.

Constipation

Definition.—Constipation may be roughly defined as a stagnation or stasis in the intestinal tract, usually the colon, which results in more or less delay in the passage of the feces beyond the time normally required for its evacuation.

Tests have been devised to fix approximately the time required to complete the passage of the feces through a normal colon; Carmine, or seeds fed with the morning meal one day should reach the feces by the following morning, and should have completely disappeared by the third morning, stasis, or constipation is indicated to a greater or less degree by the time required for the carmine or seeds to disappear from the feces.

However, the delay or slow movement of the fecal mass which is indicated by less than one bowel movement a day, is not always accompanied by poor health. Certain individuals may be so constituted that a normal evacuation from the bowels only occurs two or three times a week, without discomfort on the part of the individual, whereas other individuals begin to feel uncomfortable, develop a headache, a pasty muddy complexion, and even skin eruptions when the bowels are not emptied daily.

Constipation in certain instances might almost seem to work in a vicious circle, poor food habits,—over eating, too concentrated foods, too little water, too little exercise, may cause the stools to be hard and dry and difficult to move along the intestinal tract. Deficiency in the B vitamin may cause a lack of tone on the colon, which prevents the movements in the intestines from being normal and vigorous; the delay in the passage of the mass increases bacterial action,

and the development of toxic substances which still further reduces the tone of the tract and frequently irritates the lumen of the intestines to such an extent that it is impossible for the feces to complete their passage at a normal rate.

It is not advisable to institute a treatment for constipation until something definite is known of the existing condition in the intestines, since treatment suitable for one type of constipation would be highly injurious in another. Tests, X-rays, etc., are generally made to facilitate the diagnosis.

There are three general types of constipation, "Atonic," "Spastic" and "Obstructive." The atonic type is manifested by lack of tone in the intestines, especially in the colon, the movements become less vigorous, and the residual material from the intestines themselves—bacteria, dead cells, and unabsorbed secretions, together with the unabsorbed food materials, accumulate to a greater or less degree and move slowly down the colon, thus causing a delay in the normal elimination of waste from the intestinal tract.

Spastic constipation, is manifested by irregular spasms of the intestines, which results in both pain and an irregular movement of the mass. At times the delay is such as to amount to a stoppage, thus giving an opportunity for putrefactive bacterial action. This type of constipation is frequently found to complicate colitis, especially of mucous colitis.

Obstructive constipation is manifested by more or less obstruction or closure of the lumen of the intestine, which results in an accumulation of fecal material at one point, which may lead to the development of toxins of more or less virulent character, unless means are taken to carry off the poisons before they can be absorbed.

Dietary adjustments must be made in all three types of constipation. The following outlines will show how the daily diet may be selected, prepared and served to obtain the desired results:

Atonic Constipation [6]

In general, the diet for the first two or three months should be chiefly of cooked fruits, cooked vegetables, coarse breads and coarse cereals.

Fruits and vegetables, raw, may be gradually added after two or three months.

An increase or decrease in the quantity of vegetables or fruits may be made, depending upon the response to treatment.

If the patient is underweight, a glass of rich milk or malted milk, whichever agrees the best, should be taken with the meals and between meals, in addition to the following regime:

1. Beverages.—*May have:* Fruit juices, postum, kaffee hag, or a glass of cream and milk (1/3 cream, 2/3 milk), buttermilk and water. *Avoid:* Coffee, cocoa, hot milk and tea.
2. Bread or Muffins.—*May have:* Graham, rye, whole wheat, raisin or nut bread or muffins. *Avoid:* Cornbread, white bread and muffins.
3. Butter and Oil.—*May have:* As much as desired, the more eaten the better, unless patient is inclined to be obese. Mineral oil in salad dressing.
4. Cereals.—*May have:* Oatmeal, Pettijohn, bran breakfast food. In fact, any of the coarse cereals; serve cream and sugar with all cereals.
5. Cheese.—*May have:* Fresh cottage cheese only (occasionally).
6. Crackers.—*Avoid:* All kinds of crackers.
7. Desserts.—*May have:* Gelatin desserts, sherbets, ices and ice cream, all kinds of fruit desserts; they may be served with whipped cream.
8. Eggs.—*May have:* One egg daily.
9. Fruits.—*May have:* Stewed, all kinds, especially

[6] Courtesy of Dr. Henry G. Rudner Clinic, Memphis, Tennessee.

prunes, figs, apples; raw figs, dates, plums, apples, pears, oranges, peaches, berries, grapes.

10. Meats.—*May have:* Crisp bacon, chicken or fish twice a week.
11. Nuts.—*May have:* A few each day.
12. Salads.—*May have:* All kinds of fruit and vegetable salads with oil dressings.
13. Salad Dressings.—*May have:* Any kind, and in as large quantity as desired. *Avoid:* Highly seasoned salad dressings.
14. Soups.—*May have:* Vegetable soups, purées, cream soups. *Avoid:* Meat soups and bouillons.
15. Vegetables.—*May have:* All kinds and in as large quantities as desired, carrots, turnips, rutabogas, parsnips, spinach, dandelion, all greens, string beans, green peas, egg plant, celery, lettuce, cucumbers, radishes, tomatoes, cabbage.
16. Water.—Serve three glasses before breakfast, three glasses between meals; also before going to bed at night.

Eat cooked vegetables and cooked fruits for another month, and vegetables at noon and at night.[7]

Constipation Diet for One Day

Breakfast:

Grapefruit, stewed raisins or prunes or cantaloupes.
Pettijohn's breakfast food cooked with bran, cream and sugar.
2 graham muffins, 2 squares of butter.
2 slices of bacon.
Postum with cream and sugar.

Dinner:

Vegetable soup or tomato bouillon.

[7] This treatment for constipation has been used extensively and found to be most valuable for both the atonic and mild spastic types of constipation.

Baked potato, 1 square of butter.
Buttered carrots.
Waldorf salad (apple, celery, nuts).
1 slice of raisin bread, 1 square of butter.
Fruit jello, with whipped cream.

Supper:

Fruit cocktail—Celery.
Candied sweet potatoes.
Buttered asparagus.
Head lettuce, with 1,000 Island dressing.
Graham bread, with 1 square of butter.
Strawberry sundae and cake.
Kaffee Hag.

Medication

At the beginning of the treatment one or two teaspoons of mineral oil may be taken three times a day.

Oil retention enemas four to six ounces of sweet or olive oil warmed and injected into the rectum at night, and retained till morning. When the bowels become regulated, the oil enemas may be taken every second night, then every third, and finally discontinued. The mineral oil may be gradually decreased and finally discontinued.

Exercise and Habits

Any exercise, stooping, bending, abdominal massage, etc., which tends to develop the abdominal muscle, is advisable.

Every night and morning lie on the back and raise the extended legs as high as you can, ten to forty times. Walk three or four miles, saw wood, or work in the garden every day.

Avoid: Nicotine in any form. Never neglect a "call," visit to toilet at once, even at much inconvenience. A lost call is not easy to recover. Visit the toilet at regular times, even if no "call" is present. Take plenty of time at the

toilet. Bowels that have been constipated may move slowly at first.

The meals must be regular to make the bowels regular. Don't miss a meal, eat something, if only an apple or an orange. Take plenty of time to eat, chewing the food stimulates the colon to push the residues along. It is far better to regulate the bowels by food, and exercise, than by medicine. Have a regular time to go to the toilet.

Spastic Constipation

Spastic constipation is more common than has been supposed. It is the type that so frequently develops in highly nervous, underweight individuals, the very character of the disturbance having a tendency to increase the underweight through fear of the pain which may come with eating.

Character.—This type of constipation is characterized by irregular spasms or contractions of the intestinal tract, usually in the colon; "A" section of the intestine appears to be more or less stiff and ropelike, and the food mass upon reaching this point has a tendency to accumulate or be propelled downward in irregular movements, instead of by the rhythmic contractions of normal peristaltic action.

Cause.—The condition may be caused by long continued or excessive use of cathartics; possibly of too great a use of coarse foods, high in roughage, such as tough fibered vegetables and fruits, skins and seeds of fruits, coarse cereals (with little of the outer cellulose casing removed), coarse breads (graham, slightly bolted whole wheat flour breads), bran; excessive use of tea or coffee (also tobacco); very highly seasoned or spiced dishes, mustard pickles, pepper sauce, etc.

The spastic colon is unlike the atonic colon, inasmuch as the tone of the organ is not particularly impaired, hence the foods ordinarily used to stimulate peristaltic action may, not only do no good, but may be a real source of harm, since

mechanical pressure, and chemical irritation will increase the existing irritation in the colon, and still further delay the passage of the fecal mass, thus increasing the condition of constipation.

Dietary Adjustment.—The diet must be adjusted to meet the requirements of the individual patient, with the following points in view:

1. To nourish the patient, and bring the weight up to normal.
2. To avoid irritating the mucous membranes of the intestinal tract, which would increase the spasms and pain.
3. To select and prepare the diet in such a way as to facilitate its passage and assist in the moving and final evacuation of such residual material (bacteria, digestive secretions, and dead cells from the intestinal walls) as will accumulate and give rise to the development of toxins, most harmful when absorbed in quantities.

Bland Diet

A diet which causes no chemical, mechanical or thermal irritation.

Cereals: Strained oatmeal or other cooked cereal, such as farina or cream of wheat. *Avoid* bran.

Spaghetti, macaroni, white bread toast.

Eggs: Soft cooked, poached, scrambled with cream (over hot water), and in eggnog, custard, soft or baked.

Potatoes: White, mashed or baked.

Vegetables: Purée of corn, asparagus, carrot, green peas. *Avoid* beans in all forms.

Soups: Cream soups (half milk, half cream. Serve cream soups at least twice daily and three times if possible.

Desserts: Soft farinaceous puddings, such as tapioca, rice, cornstarch blanc mange, gelatin jellies, custard, junket.

Beverages: Tea, coffee, cocoa, milk, cream (milk and cream mixed).

Cheese: Cottage cheese, with cream.

Butter: In moderate quantities.

Meats: Meats such as chicken or fish finely chopped, can be given only on advice of physician. Later on (after first week of strict diet) the physician may order, scraped beef, rare beefsteak or lamb chop, but it is a question for the physician to determine.

Sample Bland Diet Menu

Breakfast:

Poached egg.

Toast, lightly buttered.

Strained oatmeal, with cream (1 tsp. sugar).

Milk and cream (hot or cold), flavored with cocoa or coffee if desired).

Dinner:

Cream of carrot soup, toast cubes.

Cottage cheese with cream.

Mashed potato, with butter, puréed peas.

Bread, butter, orange tapioca custard.

Milk and cream.

Supper:

Cream of wheat with cream, or rice baked in milk (2½ to 3 hours), puréed spinach, baked potato with butter, creamy egg, toast, milk and cream, chocolate blanc mange.

This diet furnishes approximately:

Carbohydrates	285 gms.
Fat	173 gms.
Protein	80 gms.

Total calories, 3000

Care must be taken to serve the beverage warm, not *orange juice.*

The tapioca custard is flavored with orange extract, *not hot.*

Spinach is used only occasionally on account of its gas forming properties, if there is no tendency to form gas this vegetable as well as tomatoes (cooked) may be used.

Obstructive Constipation

The dietary management of this type of constipation differs from that used in either of the types already discussed. It is not a question of a lack of tone in the intestines which interferes with the movement of the food mass down the small intestines and colon; nor yet a condition of spasm which causes the mass to move with irregularity, thus interfering with its normal evacuation; but a definite stoppage of more or less extent caused by adhesions, cancer, tumor, etc., which closes the lumen of the intestines to a greater or less degree, thus presenting an obstacle around which the food material must pass, in order that the individual may live.

When the lumen of the intestine is so obstructed, it is necessary to select food materials of a highly nourishing character, but of a type which will leave little indigestible or undigestible residue to add to the accumulation at the point of obstruction already caused by the inevitable bacteria secretions, and cells from the intestinal walls. There is an ever present danger of toxemia of more or less virulence in such cases, due to the absorption of the toxic substances formed by the action of the bacteria upon the unabsorbed and accumulated mass, hence every effort must be made to prevent such accumulations taking place. This can only be accomplished by giving the greatest care to the selection and preparation of the diet.

In order to minimize the dangers arising from this type of constipation, the following points must be observed in making the dietary adjustments: (1) to select only such food as will leave little if any residue to accumulate; (2) to omit food calculated to exert mechanical pressure; (3) to

omit gas forming foods; (4) to omit foods that show a tendency to putrefy easily, such as meats; (5) to prepare the foods used in a way that will facilitate their passage through the intestinal tract, and augment their absorbability. Taking these points in order, it is seen that the diet will be made up of:

Non-residue Foods, such as boiled or peptonized milk, malted milk, strained cereal, milk gruels, arrowroot gruel, very soft eggs, eggnog, peptonized milk and egg, cream and egg, orange juice and egg, buttermilk. At times it is inadvisable to include milk in the diet on account of its tendency to form curds, and the ease with which it decomposes, in such cases, buttermilk or acidoliphus milk will prove safer, it is likewise true that malted milk made with water instead of milk will give maximum nourishment, with minimum danger from putrefaction. All of the liquids and semiliquids may be reinforced with lactose or dextri-maltose (little cane sugar is used on account of its tendency to ferment and cause a formation of gas). (2) Foods that cause a mechanical pressure, such as coarse breads, cereals containing bran, long tough fibered vegetables and fruit (pineapple), skins and seed of fruit, or potato skins, gristle or long fibered meat; (3) gas forming foods, vegetables, such as cabbage, onions, cauliflower, spinach, dried beans, tomatoes; sweets, buttermilk, if found to cause a formation of gas; meat jellies or broths, meat soups; (4) foods that decompose easily, such as meats, and meat products, milk if it shows a tendency to putrefy in spite of peptonizing powder used to digest it; (5) to finely divide all foods use a solution of a semi-liquid character, which will trickle past the obstruction. When the obstruction is not great, it is possible to include cream soups, since the cellulose in such soups is finely divided, tender meat, finely divided or scraped, and cottage cheese mixed with cream, all of which are highly nourishing and afford variety to the diet.

DIET FOR DAY, in obstructive constipation:

6 A.M. 6 ounces boiled milk, reinforced with 1 T. lactose.

8 A.M. 8 ounces strained oatmeal gruel, with 1 teaspoon butter and a little sugar (cream may be substituted for butter).

10 A.M. Chocolate malted milk, reinforced with 1 T. lactose.

12 M. 8 ounces eggnog, made with cream.

2 P.M. Cream soup, made with celery water, or celery seed and salt to flavor (8 ounces).

4 P.M. 6 ounces buttermilk, or acidoliphus milk.

6 P.M. 6-8 ounces strained cereal gruel.

8 P.M. 6-8 ounces hot malted milk with lactose, 1 T.

If patient is undernourished, add two or more night feedings of like character to those used during the day.

SUMMARY

Disturbances of the intestinal tract fall naturally under one of two headings: Diarrhea and Constipation.

Diarrhea, indicating an increased rate, or excessive peristalsis.

Constipation, showing the opposite characteristics—decreased peristalsis, impaired motility and tone of the intestinal walls.

Dietary Management of Diarrhea.—Summed up in following rules: (1) Avoid food that leaves indigestible residue, which will stimulate peristalsis through mechanical pressure; (2) Avoid foods that afford chemical stimulation, acid fruits or other acids, salt foods; (3) Avoid thermal stimulation, too hot or too cold foods, very hot dishes, very cold dishes such as ices and ice cream; (4) Raw foods which may give rise to fermentation through bacterial action, and nuts; (5) Avoid gas-forming foods, cabbage, cauliflower, Brussels sprouts and raw foods; (6) Avoid excessive sugar and excessive fat; (7) increase the diet very gradually as condition improves, first by adding fine cereals,

then tender meats, cooked eggs, then puréed vegetables, until a full diet is taken without causing a recurrence of the disturbance.

Constipation.—Dietary management must be instituted to meet the requirements of particular type of constipation: (1) For Atonic Constipation give foods that stimulate peristalsis, foods that contain cellulose, whole cereals, breads made from flours containing a high percentage of bran, coarse vegetables, gas-forming foods, such as cabbage, cauliflower, Brussels sprouts, molasses; (8) Use foods high in "B" vitamin, in order to increase the general health and tone of the gastro-intestinal tract; (9) Insist upon a definite and regular amount of exercise, regular time for visiting toilet, and an observance of moderation in food intake.

For *Spastic Constipation* provide a soft, easily digested diet, low in indigestible residue, but containing a moderate amount of finely divided cellulose, to assist in stimulating normal peristalsis and to help overcome the spasms or irregular contractions of the intestines. For *Obstructive Constipation,* it is essential to provide a diet liquid in form, but highly nutritious in character. Only food that is absorbed nourishes, consequently food may be in a form to trickle past the obstruction (if the obstruction is high up in the intestines), and this spread over as much of the absorbing surface of the intestines as possible.

In any and all disturbances of the intestinal tract, it is necessary to correct any tendency to bad food habits, over-eating, under-eating highly seasoned foods, too sweet foods, and foods too high in fat. It is advisable to regulate the exercise, sleep, etc., in order that the affected parts may have an opportunity to recover.

The Relation of Constipation to Diarrhea.—The tendency of an individual to develop constipation after rigid dietary management for diarrhea must be recognized; the danger of developing mucous colitis after prolonged high

residue diets for atonic constipation, especially in those cases where bran has been very freely used and likewise with individuals who have made a habit of taking cathartics over a long period of years, requires a dietary adjustment not unlike that used in the treatment of spastic constipation. The following rules for adjusting the diet have proved satisfactory in many such cases, it is advisable to adhere to these adjustments for six months or longer, according to the advice of the physician.

Avoid milk if it gives rise to distress even after it is mixed with foods that tend to prevent the formation of large curds.

Soups.—May have cream soups made from allowed vegetable purée or strained vegetable soup, if allowed vegetables only are included.

Avoid meat soups, except occasionally.

Meats.—May have tender chicken, beefsteak, lamb chops, fish finely divided at the beginning of the diet adjustment; later on, only on condition that the meat is thoroughly masticated, *in moderate amounts only.*

Avoid tough meats of all sorts—old fowl, gristle, rich, highly flavored meat like duck, goose, venison; sardines, lobster, crab, shrimp, scallops (all fried meats or fish).

Beverages.—May have milk and cream mixtures, malted milk, Mellin's food, kaffee hag, cocoa, weak tea and weak coffee occasionally. Eggnogs, cream egg and vichy, orange juice (carefully strained).

Avoid strong tea and coffee, fruit juices which show a tendency to ferment, such as grape juice, alcoholic beverages, soft drinks (soda water, coco cola, etc.).

Desserts.—May have simple milk puddings made very soft, gelatin and agar jellies, custards, junkets, fruit whips, plain ice cream, stewed and well-sieved apples, prunes and apricots, sponge cake.

Avoid rich puddings, plum, suet, steamed berry pud-

dings, cakes (except sponge angel food, without frosting). Rich sauces, candy, jam and preserves (chiefly on account of their high sugar content and seed).

Miscellaneous.—May have butter in moderation, cream, a few nuts, except peanuts; mayonnaise dressing, made with mineral oil and lemon juice, instead of vinegar.

Must *avoid* any food of irritating character, such as pickles, raw salads, condiments.

Cereals.—May have strained, well-cooked oatmeal, cream of wheat, farina, cornmeal mush, puffed wheat, cornflakes, well-cooked rice.

Avoid unstrained oatmeal, cracked wheat, wheatena (unless strained), cereals containing bran, shredded wheat, grapenuts, grits or hominy, Pettijohn's breakfast food, wheat gems, whole wheat, cereal, etc.

Breads.—May have white bread, toasted zwiebach, Melba toast, cream toast, or milk toast (if made from white bread), spoon bread, sponge cake (yellow or angel cake) *without frosting or filling.*

Avoid whole-wheat, rye, graham or bran breads, hot breads, which may cause fermentation (especially in cases accompanied by hypochlohydria), pastry, pie.

Breadstuffs.—May have well-cooked macaroni, spaghetti or noodles with butter dressing, tapioca or rice pudding, cornstarch pudding (all containing little sweetening, clear sugar).

Avoid rich gravies (Italian), or macaroni, spaghetti or noodles. Rich cakes and pies of all sorts, heavy puddings, such as plum or suet puddings.

Vegetables.—May have puréed spinach, carrots, potatoes, green peas, string beans, asparagus tips.

Avoid cabbage, onions, celery, tomatoes, green and red pepper, lettuce, sauerkraut, cucumbers, dried peas and beans. All raw vegetables (salads).

Fruits.—May have orange juice or orange pulp free

from inner membrane, grapefruit (all membranes removed), apple sauce, puréed prunes and dried apricots (plain or made into whips), baked apple, with skin and core removed.

Avoid all berries, melons, raisins, dates, bananas, unless thoroughly ripe and soft and free from skin.

Eggs.—May have soft-cooked, poached, omelet, creamy custards, or hard-cooked, if they are finely divided.

Avoid fried eggs, egg and cheese dishes (except cottage cheese).

Milk.—May have whole milk (if thoroughly digested), if not it may be given in a mixture such as malted milk, milk and eggs, or lactose, or dextri-maltose; buttermilk. (Certain individuals have a tendency to form gas when buttermilk is taken, such cases should avoid it.) In some cases it is advisable to peptonize (pre-digest) the milk, cottage cheese.

CHAPTER XIII

FEVERS IN GENERAL

FEVER is an abnormal condition characterized by an elevation of body temperature, quickened respiration and circulation, and a certain amount of tissue waste. This elevation of temperature may be due to various conditions, such as local inflammation, infectious diseases, disturbed metabolism and food poisoning (ptomaine).

Tissue Waste in Fevers.—Fevers of short duration, such as accompany colds, tonsillitis, chicken pox and intermittent fever, remittent fever, and at times malarial fever, do not cause sufficient tissue waste to make the nutrition the important feature of the treatment. In ptomaine poisoning the tissue waste may be great, but it is the result of the poisoning, as is the fever, so that the diet needs to be adjusted only after the disturbance has abated. In the beginning, starvation is instituted and the fever disappears when the poisoning is controlled.

Treatment of Fevers of Short Duration. — In all fevers of short duration then, the treatment is directed with the following points in mind: (1) relieving the cause, (2) preventing gastro-intestinal disturbances, (3) saving the heart, kidneys, etc., extra strain.

Dietetic Treatment. — In doing this the diet is so formulated as to meet the above-mentioned conditions, and fluids seem the best form in which food can be given to bring about the desired results. The quantity of fluids should be small and the intervals between feedings short. Two-hour intervals seem best in the beginning. These intervals are lengthened as the fever decreases and the

amount of food at each feeding increased. When convalescence is established, semi-solid, soft or convalescent diet may replace the fluids and the patient gradually brought back to a normal diet.

Fluid Diet. — The following foods constitute a fluid diet: milk, whole milk, plain, peptonized, or albumenized, buttermilk, koumiss, malted milk, milk shake, milk punch, cream, whey; fruit beverages, plain, albumenized, or mixed with whole raw egg; eggnog, milk and ginger ale, cocoa, strained gruels, broths reënforced with egg or plain. Carbonated water may be added to milk or fruit beverages.

Schedule of Feeding. — The following schedule may be used as a guide in fevers of short duration: [1]

I

7 A.M.	6 oz. hot milk or cocoa.
9 A.M.	6 oz. broth reënforced with egg.
11 A.M.	Milk shake.
1 P.M.	Oatmeal gruel, 4 oz.; 2 oz. cream.
3 P.M.	Albumenized orange juice, 4 oz.; 1 egg white.
5 P.M.	6 oz. broth reënforced with egg white.
7 P.M.	6 oz. cocoa.
9 P.M.	6 oz. malted milk.
12 M. and 4 A.M.	4 oz. hot milk and 2 oz. cream.

The above furnishes approximately 750 calories.

II

7 A.M.	6 oz. cocoa.
9 A.M.	4 oz. oatmeal gruel, 2 oz. cream.
11 A.M.	Eggnog.
1 P.M.	Milk broth reënforced with egg. (3 oz. milk, 3 oz. broth, 1 egg white.)

[1] In scarlet fever and other conditions in which the kidneys may be involved the above diet is not given unless advised by physician in charge.

3 P.M. Cream, egg and vichy.
5 P.M. Albumenized milk, 6 oz.
7 P.M. Hot malted milk chocolate, 6 oz.
9 P.M. Milk broth reënforced with egg.
12 M. 4 oz. oatmeal gruel, 2 oz. cream.
4 A.M. 6 oz. malted milk (half water, half milk).

Furnishing approximately 1500 calories.

III

7 A.M. Oatmeal gruel, 4 oz., 2 oz. cream.
9 A.M. Orange eggnog.
11 A.M. Malted milk chocolate (3 oz. milk, 3 oz. water).
1 P.M. Clam broth (milk), 6 oz.
3 P.M. Milk shake, 4 oz.; 2 oz. cream.
5 P.M. Cornmeal gruel, 4 oz.; 2 oz. cream.
7 P.M. Hot cocoa, 6 oz.
9 P.M. Hot malted milk.
12 M. Hot milk, 4 oz.; 2 oz. cream.
4 A.M. Hot milk, 4 oz.; 2 oz. cream.

Furnishing approximately 1460 calories.

The two night feedings may be omitted if patient is asleep.

These diets will be seen to be below the maintenance requirements in health, but the need for care in preventing gastro-intestinal disturbances makes it safer to have it so for a few days, especially if the elevation of temperature is great. After the temperature becomes normal the following foods may be added to the diet:

Soft or Convalescent Diet. — Cream soups, soft-cooked, creamed, or poached egg, soft or baked custard, junkets, egg, cocoa, or plain vanilla ice cream, soft toast, milk or cream, buttered toast, cereals, gelatin jellies, fruit, wine, or meat jellies, vegetable purées, baked white potato, apple sauce,

baked apple, fruit whip, blanc-mange, broiled lamb chops, beefsteak, or chicken, sweetbreads, broiled or creamed brains.

Sample Menus. — The following menu is a sample convalescent dietary:

BREAKFAST

7:30 A.M. Cream of wheat 3 oz., cream 1 oz.
1 soft-cooked or poached egg.
1 slice of toast buttered.
6 oz. cocoa or milk flavored with coffee.
2 tablespoonfuls of strained prune pulp with 2 oz. cream.

10:30 A.M. Albumenized orange juice.

DINNER

12:30 P.M. Cream of pea soup, 6 oz.
1 baked potato with butter.
1 slice of buttered toast.
1 cup of cocoa or 1 glass of milk or buttermilk.

3:30 P.M. Ginger ale and milk, 3 oz. each.

SUPPER

6 P.M. 2 slices of buttered toast moistened with 4 oz. milk and 2 oz. cream.
1 soft-cooked egg or 3 tablespoonfuls of well-cooked cereal or 2 tablespoonfuls of boiled rice.
2 tablespoonfuls of apple sauce served with 1 tablespoonful of cream.
1 cup of cocoa, malted milk, whole milk, or buttermilk.

9 P.M. 4 oz. hot milk, 2 oz. cream, or 1 cup of cocoa or malted milk.

The return to normal diet is made with caution that the digestion of the patient may not be upset or the temperature raised again by overfeeding.

Energy Requirements. — In fevers of short duration it is not difficult to regulate the amount of food necessary for the maintenance of the patient, since the body will, as a rule, adjust itself when the cause of the fever has been removed. At times, however, it is necessary to make an effort to tempt the appetite of the patient when convalescence is established, that recovery may be made more rapid and complete.

Care of the Mouth. — Probably there is nothing more essential in the treatment of fevers in general and typhoid fever in particular than the care of the mouth. Well-nourished patients rarely ever show the dry, cracked tongue and lips that was formerly one of the common occurrences in typhoid fever. However, in any febrile condition the mouth is apt to acquire a disagreeable taste; this "bad taste" is so prominent in certain cases as to render it difficult for the patient to eat. This can be, to a great extent, eliminated by the use of aseptic mouth washes. When the patient is not strong enough to rinse the mouth before and after eating, the nurse must use a swab for the purpose. The food must be carefully selected and attractively served and every effort made to make food as dainty and palatable as possible.

Thirst. — Thirst is relieved with crushed ice, fruit beverages, and carbonated waters. In certain conditions it is necessary to limit the fluids, but in typhoid fever the giving of the requisite amount of liquids is one of the most difficult tasks confronting the nurse. It is wise to find out the beverages particularly liked by the patient and, whenever it is possible, make use of them. As a rule alcohol is not necessary in the diet of typhoid fever patients. However, in certain cases of that disease, as well as in febrile conditions induced by other causes, the use of alcoholic stimulation may be necessary; it must be left to the discretion of the physician to prescribe it.

SUMMARY

Intestinal Disturbances are accountable for the majority of the fevers of short duration during infancy and childhood, and in many of those cases in adults.

Malaria causes an elevation of temperature which is, as a rule, of short duration.

Contagious Diseases, such as scarlet fever, measles, whooping cough, and mumps, are likewise accompanied by more or less elevation of temperature.

Treatment consists of a period of rest in bed, with an abstinence from food, in order that the disease may manifest itself, and also that any offending food material which may cause the fever may have an opportunity to pass out of the body.

The Heart, in some of the diseases accompanied by an elevation of temperature, is more or less strained; this is particularly true in tonsillitis, diphtheria, etc.

The Kidneys are likewise taxed in certain diseases, even when the fever is not great or lasting; this is found to be the case in scarlet fever, tonsillitis, etc.

Dietetic Treatment consists in giving no food for a period lasting from twenty-four to forty-eight hours. This is followed by a liquid diet, milk and broth particularly, which is continued as long as the fever remains.

Convalescent Diet is instituted as soon as the fever has disappeared and acute symptoms subside.

Thirst is apt to be great with any elevation of temperature. It is relieved by water, crushed ice, and fruit beverages.

The Mouth requires much care, even in fevers of short duration. A simple antiseptic wash should be used several times each day.

Nitrogen Equilibrium is not sufficiently disturbed in such cases to require taking into account. Should the dis-

ease, however, develop into one causing a material breaking down of the body tissues, measures must be instituted to prevent the upsetting of the nitrogen balance in the body.

PROBLEMS

(*a*) Outline the dietetic treatment for malarial fever.
(*b*) Outline a diet order, using liquids only. Show method of reënforcing this diet.
(*c*) Show how the solids are added as convalescence progresses.

CHAPTER XIV

TYPHOID FEVER

Definition. — Typhoid fever is an acute infectious disease excited by specific bacteria (Eberth). The intestines become the seat of ulcerations (Peyer's patches), which at times perforate. The chief symptoms of the disease are fever, headache, abdominal distention and tenderness, more or less diarrhea and a rose-colored abdominal rash. The source of infection is found in the intestinal contents of a typhoid fever patient, which in some way come in contact with and infect drinking water, milk, etc.

Energy Expenditures in Febrile Conditions. — In febrile conditions the energy expenditures increase as much as twenty-five per cent. in some cases, and when bacterial activity is added to this, as is the case in typhoid fever, the tissue waste becomes correspondingly greater; hence the nutrition assumes the chief rôle in such cases, for in no other way can the tissue waste and energy expenditure be met and overcome.

Energy Expenditures in Typhoid. — In typhoid fever the problem of meeting these expenditures, and at the same time protecting the heart and kidneys from the abnormal strain placed upon them in handling the toxic substances produced as the result of bacterial action in the intestines, becomes very real. It requires eternal vigilance and patience not only from the physician but especially from the nurse, with whom so much responsibility rests. The dietetic treatment necessarily is the principal point to which all efforts must be directed. By this is understood not only the type and amount of food given the patient, but the behavior

of this food in the body as manifested by the symptoms, namely, the appearance of the patient, the condition of the mouth, the abdominal distention, tenderness, diarrhea, nausea, and vomiting, the hemorrhage which at times occurs in spite of all care, and perforation which sometimes results in death, and acidosis or acetonuria. All of which makes this disease one requiring the most efficient attention from a nutritional standpoint.

Energy Requirements in Typhoid Fever. — In a previous chapter the energy expenditures of the normal individual were dealt with; it was seen that a man at rest, that is, in bed, not rising for anything, had a normal expenditure of energy requiring from 1900 to 2200 calories per day. Now, if these expenditures were increased twenty-five per cent. by the fever and still more by the bacterial activities, it is clearly seen that the diet must be increased in proportion if the tissue waste is to be prevented and the normal body weight of the patient maintained.

High Calorie Diet. — Dr. Warren Coleman,[1] to whom we owe so much for his pioneer work in feeding in typhoid fever, devised the so-called "High Calorie Diet." This consists of foods of the most digestible type prepared in the simplest way. The weight of the patient is considered and the diet directed with the following points in view: (1) to cover the energy requirements of the body; (2) to make good the tissue waste which at times amounts to a loss of from 15 to 20 grams of nitrogen a day (or from 1/4 to 3/4 pound of muscle); [2] (3) to check or prevent the development of serious complications, kidney, heart, etc.

In the Metabolism Ward at Bellevue Hospital, New York,[3] the best results are obtained by the giving of diets

[1] Warren Coleman, University and Bellevue Hospital Medical College, Visiting Physician, Bellevue Hospital, New York City.

[2] "Diet in Typhoid Fever," by Warren Coleman, "Journal of American Medical Association," Oct. 9, 1909, Vol. LIII.

[3] "Diet in Typhoid Fever," by Warren Coleman, reprint from "Journal of American Medical Association," June 9, 1909.

furnishing from 60 to 80 calories per kilogram per day, or from 4000 to 5500 calories.

Fluid Diet. — It is clearly seen that it would be practically impossible to obtain a sufficient number of calories by using milk alone or even a mixed fluid diet to supply the above requirements. Since milk alone in such a diet would probably cause such discomfort as to make it unwise to continue it, the ideal diet would seem to be one in which the fats, proteins and carbohydrates are furnished in a semi-solid or solid form, together with a sufficient amount of liquids to prevent too great concentration in the food, to relieve thirst, and to act as a carrier of reënforcing substances, such as lactose, eggs, casein products, etc.

Absorption Food. — The question as to whether the food is absorbed when given to typhoid fever patients has often been asked. That it is has been proved in the series of calorimeter experiments conducted in the Metabolism Ward, Bellevue Hospital.[4] Here it was demonstrated that under the high calorie diet the patient consumed large amounts of food with relish and that which was not utilized by the organism immediately was stored for future needs.

Diarrhea and Tympanites. — Constant attention and study of various typhoid patients taking a maximum amount of food a day has proved that the diarrhea and tympanites which at times occur in these as well as other cases are due to too much of one or another of the food constituents rather than to the general amount of the diet. Diarrhea may then be traced to an excess of cream, and the tympanites to an excess of lactose, and a reconstruction of the dietary will often obviate the trouble.

Increasing the Diet. — It is always advisable to "go slow" in adding new foods to the diet; milk, cream, eggs and lactose are the principal articles constituting the diet.

[4] Determined by calorimeter observation from the Russell Sage Institute of Pathology in affiliation with the Medical Division of Bellevue Hospital, under Warren Coleman and Eugene DuBois.

To this are added fine cereal gruels, well-cooked rice, rice custard, tapioca custard, junket, ice cream, wine or fruit jellies, toast, eggs (soft cooked, poached, creamed, or raw, in milk), or fruit beverages, cocoa, buttermilk, koumiss, certain proprietary infant foods such as Mellin's Food, Eskay's Food, Racahout and malted milk, with a well-baked potato, milk, cream or buttered toast added as the condition and appetite warrant.

Milk Diet. — The following milk diets [5] were devised by Dr. Coleman to be given in certain cases of typhoid fever during the acute stage. These formulas consist of milk, cream and lactose and furnish from 1000 to 3000 calories per day.

	Calories
1000 calories per day —	
Milk, 1000 c.c. (1 qt.)	700
Cream, 50 c.c. (1⅔ oz.)	100
Lactose, 50 gm. (1⅔ oz.)	200
This furnishes eight feedings, each containing	
Milk, 120 c.c. (4 oz.)	80
Cream, 8 gm. (2 dr.)	15
Lactose, 6 gm. (1½ dr.)	24
2000 calories per day —	
Milk, 1500 c.c. (1½ qt.)	1000
Cream, 240 c.c. (8 oz.)	500
Lactose, 125 gm. (4 oz.)	500
This furnishes seven feedings, each containing	
Milk, 210 c.c. (7 oz.)	140
Cream, 30 c.c. (1 oz.)	60
Lactose, 18 gm. (4½ dr.)	72
3000 calories per day —	
Milk, 1500 c.c. (1½ qt.)	1000
Cream, 480 c.c. (1 pt.)	2000
Lactose, 250 gm. (8 oz.)	1000

[5] "American Journal of Medical Sciences," January, 1912, by Warren Coleman.

This furnishes eight feedings, each containing

	Calories
Milk, 180 c.c. (6 oz.)	120
Cream, 60 c.c. (2 oz.)	120
Lactose, 30 gm. (1 oz.)	120

Varying the Diet. — It has been found possible, even advisable, to vary the above diets in many cases. The disease extends over such a long period that if a fluid diet is adhered to the patient would grow exceedingly tired and even disgusted if milk alone was given, hence a mixed fluid diet such as is used in the Presbyterian Hospital, New York City is suggested.[6]

PRESBYTERIAN HOSPITAL DIET LIST

8 A.M. Milk and coffee, each 120 c.c. (4 oz.).
10 A.M. Milk, hot or cold, 240 c.c. (8 oz.).
12 M. Oatmeal gruel, 120 c.c. (4 oz.), with milk 60 c.c. (2 oz.).
2 P.M. Junket with cane and milk sugar.
4 P.M. Oatmeal gruel, 120 c.c. (4 oz.), with milk 60 c.c. (2 oz.).
6 P.M. Junket with cane and milk sugar.
8 P.M. Hot milk, 240 c.c. (8 oz.).
10 P.M. Whey, 180 c.c. with 1 whole egg and sherry.
12 P.M. Oatmeal gruel, 120 c.c. (4 oz.) with milk.
2 A.M. Junket with 60 c.c. (2 oz.) cane and milk sugar.
4 A.M. Milk, 240 c.c. (8 oz.).
6 A.M. Milk, 240 c.c. (8 oz.).

15 gm. (½ oz.) of lactose added to each of the four milk feedings.

The following foods and diet lists are used with success in various hospitals:

From 1 to 1¼ quarts of milk and 1 pint of cream and lactose, beginning with 1 tablespoonful in each milk feed-

[6] F. P. Kinnicut, "Diets Used in the Presbyterian Hospital," New York City.

ing and raising the amount day by day until the patient is taking 2 oz. (4 tablespoonfuls) at each milk feeding, given in eight feedings. This may be given as milk, hot or cold, or it may be made into cocoa, soup, ice cream, junket, or on the cereal.

LIQUID DIET

Milk
Cream
Buttermilk
Whey
Koumiss
Zoolak
Fermillac
Albumenized fruit juices, egg and orange juice
Milk shake
Broths (chicken, beef, mutton or clam), reënforced with lactose or egg or given plain.
Proprietary infant foods
Cream soups, beef juice, liquid peptonoids, panopepton
Orangeade
Lemonade
Eggnog
Milk punch
Malted milk
Malted milk shake
Albumenized milk
Strained gruels (except oats)
Cream, egg and vichy
Chocolate malted milk
Milk gruels

SOFT OR SEMI-SOLID DIETS

Eggs—creamed, soft-cooked, poached, custards, baked custards
Toast—milk or cream toast.
Gelatin—meat, fruit, or wine jellies.
Junkets—plain, egg, or cocoa.
Cereals—fine, strained cereals, except oats.
Rice—boiled or in custard.
Tapioca—custard.
Baked or mashed potato.
Cornstarch or arrowroot pudding.
Ice cream.

Meat is not given until convalescence is established, and then in only the most digestible form, such as rare beefsteak or lamb chop or a small piece of broiled breast of chicken.

Diet List Used in High Calorie Diets for Typhoid Fever

Time	*Material*		*Amount*	*Calories*
6 A.M.	Hot milk		4 oz.	78
	Cream		2 oz.	76
	Lactose		½ oz. (15 gm.)	60
8 A.M.	Cocoa	Milk	3 oz.	59
		Water	3 oz.	
		Cocoa	2 tsp.	35
		Cream	1 oz.	38
		Sugar	2 tsp.	40
		Lactose	½ oz. (1 tbs.)	60
	Egg		1	60
	Toast		1 slice (well moistened)	73
	Butter		½ oz.	73
10 A.M.	Buttermilk		6 oz.	56
12 M.	Cream of pea soup		6 oz.	300
	Mashed potato		20 gm.	28
	Toast		1 slice	73
	Butter		20 gm.	84
	Coffee and milk		3 oz. each	59
	Cream		2 oz.	76
	Sugar		2 tsp.	40
	Lactose		20 gm.	80
3 P.M.	Orange juice and egg	Orange juice	3 oz.	38
		Egg	1	60
		Lactose	30 gm.	120
5 P.M.	Farina		3 oz.	102
	Milk		2 oz.	59
	Cream		2 oz.	76
	Lactose		20 gm.	80
	Egg		1	60
	Apple sauce		1 oz.	30
	Cream		1 oz.	38
	Cocoa		6 oz.	108
	or			
	Tea and		3 oz.	0
	Milk		3 oz.	78
	Sugar		2 tsp.	40
	Toast		1 slice	73
7 P.M.	Gruel		4 oz.	102
	Cream		2 oz.	76
	Lactose		15 gm. (½ oz.)	60
9 P.M.	Broth		6 oz.	18
	Egg white		1	13

Diet List—*Continued*

Time	*Material*	*Amount*	*Calories*
12 M.	Milk	4 oz.	78
	Cream	2 oz.	76
	Lactose	20 gm.	80
3 A.M.	Milk or	4 oz.	78
	Malted milk	1 tbs.	58
	Cream	2 oz.	76
	Lactose	20 gm.	80
		Total calories	3145

Advantages of Newer Treatment. — A marked difference is noticed in the patients treated by the old starvation diets and those given the high calorie diet. Dr. Coleman states [7] that while the range of temperature is apparently unaffected, the total duration of the disease is shortened in some instances by months through the shortening of convalescence. He further states that certain symptoms which have hitherto been attributed to the specific action of the typhoid bacillus have been discovered to be due to faulty methods of treatment, particularly to an inadequate or improperly balanced diet. The various investigators who have made the study and treatment of this disease a lifework claim that the mortality from this disease has been tremendously reduced by the use of the high calorie diets which maintain the nutrition of the patient throughout the disease, thus eliminating the horrors of the long, tedious convalescence which tried the nerves and patience of the patient, the nurse, and the physician. There is no doubt that so far as the administering of this diet is concerned it requires more effort on the part of the nurse than the old treatment of a glass of milk every two or three hours. It is necessary for the nurse to be able to carry out the

[7] "Journal of American Medical Association," Aug. 4, 1917.

orders as expressed in the diet lists, to be able to compute the proteins (nitrogen), fats, and carbohydrates in a food or recipe. But this is readily done by studying the tables given in the appendix of this text. She must likewise be able to recognize the symptoms as they arise. In hospitals, the urinalysis is made as a routine procedure. In private cases the physician will either have the analyses made or expect the nurse to be able to make the simple tests.[8]

One of the greatest difficulties attending the administering of the high calorie diet is persuading the patient to take sufficient food for his needs. The fluids are often more difficult to give in quantity than the more solid foods, and it requires much tact on the part of the nurse to prevent a refusal of the necessary fluids. However, if the patient is possessed of even ordinary intelligence, an explanation of the reasons for the large amount of food will as a rule be all that is necessary. Few individuals will willingly prolong an illness attended with the discomforts generally present in typhoid fever.

Hemorrhage occurs in a certain percentage of cases of typhoid regardless of the diet, whether it be a strictly milk diet or the high calorie diet just described. The measures to combat them are essentially the same. It is necessary to guard against excessive tympanites since the pressure therefrom against the ulcerated intestinal walls may cause perforation resulting in hemorrhage. Lactose at times causes an evolution of gas as do fats under certain circumstances. Hence it is necessary to follow symptoms and watch the stools in order to determine which food material is to blame for the tympanites and reduce the allowance of that food in the diet.

Idiosyncrasies against Milk.—Certain individuals manifest an inability to take milk. This may be real or imaginary. When it is a true idiosyncrasy, it may be found

[8] See urinalysis, p. 386.

necessary to substitute some other food for the milk in the diet, but great care should be taken to determine the real character of the disagreement before eliminating so invaluable a food from the diet. When the disagreement proves merely a distaste for milk, some of the different methods used in disguising it, such as flavoring or coloring, may be practiced. Otherwise, it is well under the circumstances to use some of the pre-digestive methods in order to increase its utilization. It is well to emphasize the value of accurate data on this subject as it is exceedingly difficult to administer a high calorie diet without milk in some form.

Essential Points. — Thus the dietary in typhoid fever is seen to be the most important part of the treatment. A careful study of the tables will enable the nurse to do her part in nourishing the patient. It is necessary that she be able to compute the nitrogen, carbohydrates, and fats in a diet and arrange these constituents in such a way as to give the desired amount of each in the dietary and in a form acceptable to the patient.

SUMMARY

Rate of Metabolism is greatly increased in typhoid fever even over other febrile conditions, not only on account of the elevation and duration of the fever, but also on account of the activities of the specific bacteria in the intestinal tract which differentiate this disease from other febrile conditions.

Energy Expenditures and Requirements of the body in typhoid fever, on account of the character of the disease, are much greater than those of the normal individual and must be met by an increase in the diet if the body is to be saved from destruction.

The Bowels. — Diarrhea develops during any period of the disease due to excess amount of fat or to a disagreement of some of the other food constituents. It is advisable to

cut down the allowance of cream temporarily and to watch stools and other symptoms for evidences of dietetic errors.

Hemorrhage must be guarded against by eliminating, as far as possible, all substances liable to cause an excessive gas formation in the intestines.

Absorption of Food is as a rule good. The patient is usually able to handle a large quantity of food provided it is judiciously administered with a due regard to the symptoms manifested at the time.

Simplicity of Diet is absolutely essential. All the materials must be selected carefully according to the physician's orders and prepared with the greatest care in order to prevent digestive disturbances.

High Calorie Diet is one in which the fuel value of the food ingested meets or exceeds the energy expenditures of the patient. Foods composing the diet are, milk and eggs for the proteins, with carbohydrates and fats in their simplest and most digestible form to balance the diet.

Administering a High Calorie Diet is accomplished successfully provided the nurse exercises care with regard to the symptoms arising from time to time. These must be carefully noted and reported to the physician, for in this way only is it possible to give a sufficient quantity of food to cover the excessive breaking down of the body due to the disease.

Fluid Diet is at times necessary since certain patients cannot tolerate a high calorie diet, but this is a point decided by the physician. A fluid diet consists of fluids alone, milk in particular, with broths and fruit beverages as ordered. The milk is given in definite amounts and at stated intervals.

Milk Diet is one consisting solely of milk or in which the bulk of the nourishment is furnished by milk. It may be reënforced or not as desired. Lactose is the substance commonly used as a reënforcing agent. It is impossible to

cover the energy expenditures of typhoid fever with a milk diet even if it is perfectly administered, but certain complications make it, at times, the only rational method of feeding.

The Advantages of High Calorie Diet over other diets are distinctly noticeable in typhoid fever patients. Those treated by this method are more comfortable during the course of the disease and are saved a long, tedious convalescence which has made the starvation treatment a thing of horror in the past. The return to health is attended by a much better physical condition when the patients are well nourished than is possible when they are kept on practically a starvation ration. The mortality from the disease has been materially lessened by the administration of the high calorie diet.

Acidosis may develop in typhoid fever patients and must be guarded against. The behavior of the fat in the body should be carefully watched and the amount reduced at the first evidence of acidosis. At the same time an increase in the carbohydrates may assist in overcoming the condition. This adjusting of the diet, however, is entirely in the hands of the physician.

The Kidneys in typhoid fever patients are under a great strain, chiefly on account of the increased rate of metabolism. Great care must be exercised in the dietetic treatment to prevent these organs from being overworked with a consequent development of nephritic conditions.

Care of the Mouth in any febrile condition is important, but especially so in typhoid fever, where the disease itself causes a most unpleasant taste in the mouth. This prevents the taking of nourishment with any degree of comfort, hence the mouth should be cleansed before and after each feeding. Any of the aseptic mouth washes may be used.

Thirst may be relieved by plain or carbonated waters,

fruit beverages, and crushed ice. When in certain complications the fluids in the diet are in a measure restricted, ice is used and water is given in spoonful doses. This, however, is the exceptional, rather than the ordinary state of affairs.

Increasing the Diet after a fluid diet must be made with great care in order to prevent a relapse. Following the high calorie diet the increase is simple. The patient passes from the prescribed foods to meat with apparently no effort. The increase should not be made, however, until convalescence is firmly established.

Reënforcing the Diet. — On account of the great increase in the rate of metabolism and because of the difficulty of furnishing the requisite number of calories in the diet, reënforcing agents such as lactose, eggs, some forms of casein, or beef preparations are used.

Idiosyncrasies against certain foods are, at times, manifested by patients. Efforts must be made to determine whether they are real or imaginary before eliminating any food which may be of importance to their future welfare.

PROBLEMS

(*a*) Give a sample diet order, using liquids only. Raise the fuel value of the diet from 2000 to 3000 calories.

(*b*) Formulate a diet order, using the high calorie diet, fuel value 3500 calories.

CHAPTER XV

DISEASES OF THE RESPIRATORY TRACT

TUBERCULOSIS, PNEUMONIA, AND TONSILLITIS

TUBERCULOSIS

THE dietetic treatment for tuberculosis must, as in any other pathological condition, depend largely upon the general condition of the patient, and the symptoms manifested at the time.

Character of Disease. — The disease may have reached an acute stage in which the rise of temperature is marked and the progress of the tuberculous symptoms rapid, or it may be found to be an old chronic condition in which the progress is slow.

Again, the patient may be found to be suffering from a tuberculosis which is neither acute nor very slow. Each of these stages requires slightly different treatment which, however, for the main part is much the same.

Individuals having an incipient form of tuberculosis have been known to develop an acute form of the disease upon being subjected to a strenuous treatment for some other and entirely different condition. This has been especially noticeable in certain individuals to whom the starvation treatment is given.

Dietetic Treatment in Acute Stage. — The dietetic treatment of the acute tuberculosis under such circumstances must necessarily be adapted to that of the original disease for which starvation was believed to be necessary. The forbidden foods must still be omitted from the dietary, but in these cases it is found advisable not to prolong the

starvation treatment but to substitute foods which will do the least harm under the circumstances. This is necessary to cover the energy requirements of the body and to make good the tissue wasted through the development of the specific disease.

Dietetic Treatment in Chronic Stage. — The diet for tuberculosis has been so widely discussed and so universally used that a few words only seem necessary here. One of the chief points to be emphasized is the danger arising from gastro-intestinal disturbances. The digestive apparatus of the tuberculous individual is more apt to be impaired, so that any undue exertion required to digest a meal is likely to bring about disturbances more or less serious in character.

Method of Administering Diet. — For this reason it is no longer the custom to stuff the patient in an effort to overcome the inevitable tissue waste, since such treatment in many cases defeats the end for which it was intended, bringing on acute indigestion, or at times diarrhea, which might readily cause a greater loss of body weight than could possibly be produced by the surplus food given.

Adjusting the Diet. — More and more is it coming to be understood that the diet must be adjusted to suit the individual. Three wholesome meals a day are insisted upon, with lunches given between the morning and midday meal and during the course of the afternoon. Many patients are found to sleep better after they have partaken of a light lunch, consisting of hot milk, malted milk, or like beverages and crackers, so that this third meal is added to the other five. In this way the individual suffering with tuberculosis is assured of an efficient diet to meet the needs of the body without overburdening the digestive apparatus or overtaxing the excretory organs. The increased metabolism taking place in such patients, due both to the specific bacteria and to the febrile condition, is, as far as possible, provided for.

Schedule of Diets. — The following dietary régime may be useful in formulating menus for tubercular patients:

BREAKFAST

Fruits.
5 oz. cereals with cream.
1 or 2 eggs, simply prepared to prevent indigestion.
2 slices of bacon, ham; fish cake or chop.
2 slices of toast or crusty rolls with butter.
Coffee, tea, or cocoa, with or without cream.[1]

LUNCH

Vegetable or cream soups.
Cold meat, lamb chops, oysters, or fish.
Baked white or sweet potato.
1 green vegetable, — greens, cabbage, spinach, or string beans.
Stewed fruit or baked apple.
Rice or tapioca pudding.
Tea.
Bread and butter.

At the end of the meal one glass containing two-thirds milk and one-third cream. If the latter disturbs the digestion reduce the amount temporarily, or add one-half the contents of a tube of peptonizing powder, or one-quarter of a glass of limewater.

DINNER

Meat, lamb, mutton, chicken, duck, game, or fish.
Mashed or creamed potatoes.
1 or 2 green vegetables.
Simple salads.

Simple desserts consisting of puddings, custards, wine or fruit jellies, ices or ice cream, sponge cake or angel food cake.

[1] The addition of cream to coffee produces acute indigestion in certain individuals, hence the nurse must be governed by this point in formulating the diet.

The milk and cream is taken at the end of the meal as directed above.

Lunches

11 A.M., 4 P.M., 9 P.M., consisting of milk, malted milk, junket, buttermilk, albumenized broth, albumenized fruit juices, cream, egg, and vichy, eggnogs, served with crackers or sponge cake; cereal gruels and raw eggs taken with water, milk, or sherry may likewise form a part of this diet, since the nourishment in them is both concentrated and palatable.

Use of Eggs. — The old method of forcing the patient to eat a dozen or more raw eggs a day is no longer used, but three or four a day will be of undoubted value to the patient, provided they agree. There are patients, however, with whom eggs act almost as a poison, and in these cases it is decidedly unwise to force them.

Use of Milk. — Milk is to be used abundantly. If it should disagree, it may be peptonized or modified with lime-water. At any rate, every effort should be made to enable the patient to drink at least one quart a day, and more, if possible.

If it fails to agree even when so treated, it should be abandoned, since the discomfort caused under the circumstances is more detrimental to the welfare of the individual than any benefit which he may gain by the small amount which may be absorbed.

High Calorie Diet. — As long as the patient is in bed the diet cannot be as full as it is made when he is up and about, as the body is then using more material to provide for the extra exertion and needs more food to replace that which has been utilized. Consequently the high calorie diet [2] will be found as a rule sufficient. As soon as the patient is able to receive more food without incurring digestional disturbances, it should be supplied, keeping ever in mind the danger of its upsetting his digestion.

[2] See "High Calorie Diet for Typhoid Fever," Chapter XIV.

Advice to Patients. — The patient must be impressed with the necessity for living a simple, wholesome life, free from excesses of all kinds. The need for a regular régime in the beginning must be strongly emphasized. Too strenuous exercise and the consequent over-fatigue at times completely overcome all the good which has been accomplished in weeks or even months of studied effort, so that rest is an essential part of the tuberculous régime. The patient should sleep from eight to ten hours out of every twenty-four, and if this sleep is taken in the open, that is, in a tent or on a sleeping porch, the benefits derived therefrom are inestimable.

The Bowels. — The bowels should move every day, even if some gentle laxative or an enema has to be used to bring about the desired result. In a majority of cases, mineral oil or bran muffins, prunes, raisins, and figs prepared with senna will be entirely sufficient, however, and these substances are much less harmful than drugs, for the habit of taking purgatives becomes a fixed one in a short time, and is especially liable to become so when the patient is forced, by reason of the sedentary life, to depend on some such measures.

Massage. — Massage has been found beneficial in many cases, giving the needed exercise to the body, which it is otherwise unable to obtain.

CHRONIC TUBERCULOSIS

In chronic tuberculosis, the patient should be instructed in the care necessary for his protection. He should be advised to report to the physician any symptoms occurring during the course of the disease, especially any hemorrhage. He must be reassured of the chances of recovery, even after hemorrhage has occurred. It is not well to encourage the habit of taking the temperature or weighing daily, since the knowledge of the fluctuations which inevitably occur in

these conditions may worry the patient to such an extent as to interfere with his final recovery.

Rest, Sleep, and Fresh Air. — Moderation in physical exertion, wholesome food at regular intervals, plenty of rest and sleep, preferably in the open, and an effort made to look forward to a complete recovery will go far toward bringing about the desired result. The tuberculous patient who sets his mind on recovery, refusing to be discouraged by the numerous setbacks which may from time to time occur, has a much greater chance of living a long and useful life than the patient who makes no effort in this direction.

Reënforcing the Diet. — The following reënforced foods have been found valuable in the diet for tuberculosis, especially in those cases which are confined to bed and in which the effort to eat causes more or less gastric distress:

Milk, whole milk, milk and cream, milk diluted with Apollinaris water, peptonized, modified milk, reënforced with egg or egg white or reënforced with one to four tablespoonfuls of lactose, malted milk, buttermilk, cream, egg, and vichy, milk shake, milk punch, malted milk shake, chocolate or cocoa malted milk, albumenized fruit juices, egg and orange, egg and wine, reënforced, if desired, with lactose, albumenized broths, proprietary infant foods, such as Eskay's Food, Nestlé's Food, Mellin's Food, Racahout, cream soups reënforced with lactose or egg, junkets, and ice cream.

Pneumonia

The diet in pneumonia is of considerable importance, since in this condition the strength of the patient is taxed by reason of the character of the disease, and the only means of attaining endurance to carry him through this trying period is by providing proper nourishment.

Dietetic Treatment. — The same general outline of diet is used as in acute infectious fevers, milk forming the basis of the diet. The patient is given an abundance of water and

other beverages in addition to the other fluid foods to relieve the thirst which is so often a common symptom in this disease.

It is sometimes found advisable, however, on account of the vomiting which may occur, to give a more concentrated form of nourishment, in which case liquid peptonoids, trophonine, and panopepton furnish a form of nourishment which is both strengthening and stimulating in character, and for these reasons particularly desirable. Freidenwald and Ruhräh advise against the use of starches and sugars in most cases of pneumonia.

Daily Diet Schedule. — The same fluid diets used in acute fevers and administered at two-hour intervals are advisable here. The following régime is used in pneumonia:

6 A.M.	6 oz. malted milk.
8 A.M.	6 oz. cocoa.
10 A.M.	4 oz. oatmeal or cornmeal gruel with 2 oz. cream.
12 M.	6 oz. chicken broth reënforced with 1 egg white.
2 P.M.	6 oz. malted milk chocolate.
4 P.M.	6 oz. albumenized orange juice.
6 P.M.	6 oz. chicken or beef broth, reënforced with egg white.
8 P.M.	6 oz. hot milk.

Night feeding consisting of milk, malted milk, or reënforced broth may be given at 12 M. and 4 A.M. if patient is awake.

The above diet may be varied by adding some of the beverages mentioned in the diet for tuberculosis or fevers.

Convalescent Diet Schedule. — As the acute symptoms subside and convalescence advances, the following diet may be instituted:

I

Breakfast	3 to 4 oz. cereal gruel with 2 oz. cream.
	1 soft-cooked egg.

10:30 A.M. 6 oz. chicken broth, reënforced with egg, or 6 oz. albumenized orange or grape juice.
1 P.M. 6 oz. oyster soup with rolled crackers.
¼ cup wine jelly with 1 tbs. cream.
1 glass (6 oz.) milk — 2 parts milk, 1 part cream.
3 P.M. Milk shake (4 oz. milk, 1 egg white).
Supper 4 oz. farina with 1 oz. cream.
6 oz. cocoa.
9 P.M. 6 oz. malted milk.

Hot milk, broth, or malted milk may be given during the night at 12 or 4 A.M. if patient is awake.

II

Breakfast 4 oz. orange juice on cracked ice.
3 or 4 oz. strained oatmeal with cream or butter.
1 slice soft toast.
6 oz. cocoa.
10 A.M. 1 soft-cooked egg on toast.
6 oz. milk.
Dinner 6 oz. cream of celery soup.
2 oz. rice.
4 oz. custard (soft or baked).
6 oz. milk or cocoa.
3 P.M. 5 oz. cream, egg, and vichy.
Supper 1 soft-cooked egg.
1 small baked potato.
6 oz. cocoa or malted milk.

III

Breakfast Stewed prunes.
3 or 4 oz. cream of wheat with 1 oz. cream.
1 soft-cooked egg.
1 slice of toast with butter.
6 oz. cocoa or milk.

10:30 A.M. Eggnog (1 egg, 4 oz. milk, 2 oz. cream, 1 tbs. whisky or sherry wine).
Dinner Cream of spinach soup.
2 oz. mashed potatoes.
2 oz. green peas.
1 slice toast with butter.
2 oz. rice or tapioca custard.
3 P.M. 6 oz. albumenized fruit juice.
Supper 1 slice toast.
1 poached egg.
6 oz. cocoa or hot milk.
2 or 3 oz. stewed fruit or prune whip.

The diet may be reënforced with lactose and meat added only when convalescence is well established.

Tuberculosis Nursing. — The nurse must keep in mind that the lungs are in a condition more or less out of commission, and their work of excretion is forced upon the kidneys. For this reason, as well as on account of the increased strain upon the heart, it is necessary to keep the diet light and avoid all foods which may in any way exert an unfavorable influence upon either the kidneys or the heart.

Milk Diet. — A strict milk diet has been found necessary in certain cases of pneumonia, but this is used only while the febrile condition lasts, after which the diet is gradually increased, as in the case of acute nephritis and in diseases of the heart, to meet the needs of the individual.

TONSILLITIS

Dietetic Treatment. — The diet in this condition is much the same as that used in other acute febrile conditions, that is, a fluid diet, the basis of which is, as a rule, milk.

The development of nephritis and certain cardiac symptoms at times follow attacks of tonsillitis, and for this reason the urine must be examined frequently and the diet

carefully adjusted to avert, if possible, this danger. When acute nephritis does follow the attack of tonsillitis, the diet must necessarily be adjusted to meet that condition rather than that of the original disease.

Special Diets. — The Mosenthal diet, and at times the Karell Cure, is used with more or less success. This, however, is adjusted by the physician. It remains for the nurse to report any unfavorable symptoms as soon as they occur, and to carry out the line of dietetic treatment deemed advisable by the physician.

SUMMARY

TUBERCULOSIS

Form. — Acute and chronic in character. The chief aim of the treatment in the former is to prevent its development into a chronic form.

Rest. — Sleep, preferably in the open air, in a tent or on a sleeping porch.

Proper Surroundings should be striven for. The patient should be kept tranquil in mind and body, free from disturbing worries and assured of the possibility of recovery with proper care.

Diet should be adequate without being too abundant; stuffing the patient is no longer considered necessary, in fact it is believed that forcing the eating of large quantities of eggs, etc., defeats its own ends, upsetting the digestion and causing a disgust for food almost impossible to overcome.

Gastro-intestinal Disturbances are apt to develop as the disease progresses. These are treated as in other conditions so complicated, except that the period of starvation must necessarily be limited on account of the metabolic waste already taking place from the disease itself.

PNEUMONIA

The Lungs, as in pulmonary tuberculosis, are the seat of infection and are temporarily hampered in their work of excretion.

The Kidneys bear the brunt of the extra work caused by the impairment of the lungs, consequently all unnecessary work must be spared these organs if they are to be prevented from being overtaxed.

Nephritis is one of the complications apt to develop when the kidneys are not sufficiently strong to carry on their own work and that generally done by the lungs.

The Heart. — Cardiac symptoms are also likely to develop during attacks of pneumonia and make the disease one to be dreaded and guarded against.

The Diet. — The dietetic treatment in pneumonia is like that used in acute infectious diseases, fevers in general, fluids constituting the form of diet and milk the chief food, as long as there is an elevation of temperature.

TONSILLITIS

The Heart. — As in pneumonia, the development of cardiac symptoms must be guarded against. These symptoms may not develop at once but show later during or after convalescence.

The Kidneys. — Nephritis also develops in some patients and the treatment is directed as far as possible to prevent its developing into a chronic form.

Dietetic Treatment is the same as used in acute infectious conditions, fevers of short duration, taking care to institute the diet for acute nephritis should the patient show evidences of this disease.

PROBLEM

Write a diet order for a tuberculous patient weighing 135 pounds, allowing 3000 calories and fifty per cent. of the protein to be derived from animal sources.

CHAPTER XVI

DIETETIC TREATMENT BEFORE AND AFTER OPERATION

PREOPERATIVE FEEDING

The dietetic treatment which is essential before and after operations is deserving of attention here, since it constitutes one of the points so frequently overlooked or slighted. As a rule the treatment depends (1) upon the character of the disease for which surgical intervention is necessary, and (2) upon the general health and physical condition of the patient in question.

Preparatory Treatment. — In many cases it is found to be advisable to build up the patient before subjecting her to the shock of an operation, and the more serious the operation the more necessary this "building-up" process.

The character of the disease also has much to do with the preliminary diet. In certain pathological conditions involving the gastro-intestinal tract, for example, the patient comes to the surgeon after medical treatment has failed to give relief and surgical intervention is necessary to save life. The body is found to be in a condition bordering on starvation, anemic and exhausted from insufficient nourishment. The functions of the blood-making organs have become out of gear, as it were, and the blood consequently is deficient in one or more of its essential elements. For such patients it is wise to attempt to reënforce and strengthen their bodies before operation, that they may have more endurance to withstand the shock which is more or less unavoidable.

Adjusting the Diet. — In any case where preliminary diet is prescribed the condition for which the operation is necessary determines the nature of the diet; for example, if the operation is to be upon the kidney, the diet beforehand would naturally be in the nature of a nephritic one to save the diseased organ unnecessary work. If the stomach or intestinal tract required surgical care, the diet would necessarily be formulated to meet the particular needs of the organ in question, an analysis of the stomach content furnishing the keynote of the diet. In any case the food must be simple in character and well prepared. All food in any way liable to bring about indigestion should be studiously avoided.

Habits. — The habits of the patient must be regulated so that she may not "overdo"; at the same time, gentle exercise may be the very thing needed to give an impetus to the appetite and thus assist in the adding of strength for the approaching ordeal. Many patients respond readily to a change of air and scene and frequent small meals instead of a few large ones, — a lunch in the mid-morning and mid-afternoon hours, consisting of a glass of milk and a cracker or malted milk chocolate or reënforced fruit juices. A cup of warm milk before retiring induces the much-needed sleep, hence is advisable under the circumstances.

The Bowels. — The bowels must be kept open. Coarse bread such as that made from bran or graham flour is advisable. Prunes and figs cooked with senna leaves are likewise simple laxatives which are both palatable and effective. For stubborn cases of constipation it is often found that a teaspoonful of a conserve made with a third of a pound each of raisins, prunes, and figs ground fine, with an ounce of senna leaves added, taken at bedtime and before breakfast, will overcome the condition and make the patient more comfortable and the general health better.

Preliminary Light Diet. — The day before the opera-

tion the diet must be light; the intestinal tract must not be filled with a food mass which is difficult to get rid of. On the morning of the operation the patient is given no food if the operation is to be performed at an early hour, otherwise a cup of tea, coffee, weak cocoa, or broth with a cracker is given. Some physicians give a glass of milk at this time, while others do not. It is the physician who must decide the question if there is any doubt about it. The stomach must be empty before administering the anesthetic.

In certain emergency operations when it has been impossible to prepare the patient ahead, the difficulties attending the administering of the ether are sometimes greatly increased. The cleansing of the stomach and intestinal tract oftentimes eliminates or materially decreases the nausea and vomiting which so often forms one of the most dreaded sequences of the operation. For this reason many surgeons require the patient to be given lavage before leaving the operating room.

Total Abstinence. — No food is given for twenty-four hours following the operation (1) on account of the nausea and vomiting which so often follows the giving of an anesthetic — ether particularly — and (2) because the entire organism is better for a complete rest.

Routine Treatment. — The routine treatment in uncomplicated cases is rest, then water, very hot or iced, or carbonated, or vichy in spoonful doses, then albumen water, broth, etc., then milk, buttermilk, koumiss, etc., after which the semi-solids, etc., until a normal diet is reached. After a week or more the character of the operation certainly determines the dietetic treatment. To quote Dr. Thomas S. Brown,[1] "To give the same diet after pyloroplasty, gastro-enterostomy, gall-bladder operation, or gastric resection

[1] "Some Gastro-intestinal Notes," "The Medical Clinics of North America," Vol. I, No. 1, pp. 192–193, by Thomas R. Brown, Johns Hopkins Hospital.

as we would after operations for fracture of the thigh or cancer of the breast shows a basic ignorance of the pathologic physiology of the former group of cases." "We should remember that hyperacidity remains long after the underlying cause has been removed and it is tempting providence, to say the least, to ply these patients with tomato soup, salad dressing, and coarse food in the early stages of their convalescence."

Character of Diet. — It must be kept in mind that the character of the diet is of vital importance, especially in the after-treatment of operations upon the stomach. In gastro-enterostomy, for example, the food mass passes from the stomach directly into the upper part of the small intestine through the new opening. Thus the semi-liquid food highly acid in character comes in direct contact with the delicate intestinal walls which are accustomed, not to the acid, but to a neutral or alkaline medium.

Adjusting Diet to Disease. — Thus it is demonstrated that unless care is used in selecting the diet this portion of the intestinal tract will be injured; hence the nurse must understand which foods are liable to stimulate an excess flow of acid in the stomach and avoid them. She must also keep in mind that the foods given must be in a semi-liquid or very finely divided condition, since the mechanical efforts made by the musculature of the gastric organ act as a direct stimulant to the secretory cells of that organ.

Much of the responsibility thus rests upon the nurse whose business it is to administer the diet. The efforts of the best surgeon in the world may be entirely overcome by a careless, thoughtless, or ignorant nurse.

Rectal Feeding. — In some cases it is found necessary to nourish the patient more than is possible by mouth. This is especially so with emaciated and very weak patients and for those who have undergone operations upon the

mouth or throat and in some of the above-mentioned stomach cases when the passage of any food over the newly-operated-upon surfaces is inadvisable. In these cases rectal feeding is resorted to and from two to three nutrient enemas [2] alternated with saline enemas are given daily.

Under ordinary conditions when the patient has not been operated upon for gastro-intestinal disorders, gall-bladder or kidney diseases, the dietetic régime is as follows:

Postoperative Feeding.—First day: starvation, a little hot or cold water or carbonated water may be given if there is no nausea or vomiting. If nauseau or vomiting persists, a few spoonfuls of champagne or clam broth or juice will often check or relieve it entirely. Fluids alone must be given during the first forty-eight hours after the operation. When stimulation is necessary, the type and character must be ordered by the physician. When nausea entirely disappears, well-skimmed broth milk, clam or oyster broth, buttermilk, koumiss, malted milk, may be given. A gradual return to the normal diet is made, adding soft toast, soft-cooked eggs, junket, ice cream, meat, wine, or fruit jellies before solid food is introduced into the dietary.

After-care in Feeding.—Care must be observed to prevent indigestion after almost any operation, but especially after abdominal operations there is a great tendency to form gas, hence anything which in any way increases the tendency may bring about a condition of extreme discomfort and even acute pain to the patient. For this reason it is unwise to follow too closely the desires of the patient as to the food to be eaten; for example, corned beef and cabbage may be the thing of all others desired by the patient, but it would be the height of folly to risk such a meal until all danger of digestional disturbances is at an end. It

[2] See Formulas for Nutrient Enemas, pp. 141-142.

is wiser to avoid such disturbances than to trust to relieving them after they occur. The digestion of even a perfectly normal individual is at a disadvantage when that individual is deprived of outdoor exercise. How much more so will it be when the entire organism is taxed by the ordeal through which it has just passed. Convalescence is never hastened by imprudent eating, and a condition as bad as the original may be brought on by lack of care on the part of the one whose business it is to feed the patient.

CONDITIONS REQUIRING SPECIAL DIETS

Post-operative Feeding for Ulcer of the Stomach and Duodenum [3]

First Day.—Sips of hot water *ad lib.* (usually not until 48th hour). Proctoclysis tap water or glucose and soda bicarb.

Second Day.—10 gr. sodium citrate (usually not well tolerated) in 2 oz. water every three hours. If patient is doing well, water as desired. Junket or oatmeal jelly, 2 oz. at a feeding if patient desires and is not disturbed by it, every three hours to alternate with the sodium citrate solution.

Third and Fourth Day.—Feed every three hours, alternating the following: Junket, oatmeal or barley jelly, boiled milk with sodium citrate (usually not well borne) 2 oz. to 4 oz. at a feeding if well borne, otherwise continue as on the first and second days.

Fifth, Sixth and Seventh Days.—Same as on third and fourth days. Alternating junket, rich milk with soda (15 gr.) or lime water (1½ oz.). Simple custard lightly cooked,

[3] When serving a Post-operative Ulcer Diet all foods stimulating to acid secretion should be avoided. *No broth* should be served.

oatmeal jelly, blanc-mange, soft-cooked egg. Increased feedings and quantities three hours apart.

Do not disturb patient when resting.

Diet After Tenth Day as a Rule

Breakfast.—4 to 6 oz. well-cooked cream of wheat, oat meal (strained) or farina, 1 soft-cooked or poached egg, 1 piece of toast or zwieback, 1 cup hot water and cream.

10 A.M. and 3.30 P.M.—⅔ glass rich milk with 1 oz. lime water or 15 gr. soda.

Noon Meal.—Serving of cream soup of purée of potato, pea, bean or asparagus. After seventy-second day (choice of chicken or meat jelly, stewed calves brains, scraped beef balls). Potatoes, small (baked or mashed). Sweet apple sauce or apple pulp served warm. Bread and butter. Hot water and cream.

Evening Meal.—Same as at noon except no soup. Substitute or additions such as custards, gelatin, jello, simple pudding, creamed chicken or squab. Hot water and cream flavored with tea. Meat or chicken only twice per week. Fish if desired on Friday.

8.30 P.M.—Milk toast of hot milk with soda or lime water.

General Instructions.—Avoid large meals and overeating, especially within the first three weeks after operation. Eat small amounts oftener, if necessary. Eat slowly and chew the food thoroughly. Use the tooth brush after each meal.

It is advisable to drink a glass of fresh, raw or boiled milk between 10 and 11 A.M., between 4 and 5 P.M., and at bedtime, to which a tablespoon of lime water has been added.

After three or four months, patient may gradually partake of a normal liberal diet. Should this disagree, a return

to the ulcer diet temporary from time to time is advisable. Water may be taken freely between meals. Physical and mental fatigue and worry should be avoided.

If there is a tendency to sour stomach, take a tablespoonful of milk of magnesia one hour after meals.

The following are favorable for ulcer cases:

Soups.—Cream of celery, cream of potato, cream of oyster, tomato, noodle, vegetable purée. Take no soups made with meats or meat stock.

Meats.—Any easily digestible meats (minced, broiled or boiled) as white of chicken, beef, mutton, lamb, brain, fish and oysters and broiled steak. Eggs may be taken in any form, except fried.

Vegetables.—(Best when strained). Asparagus, spinach, peas, beans, potatoes, carrots, cauliflower, etc.

Cereals.—Any kind with cream and sugar; stale bread, toast or zwieback.

Desserts.—Any light puddings, custard, ice cream, gelatin plain.

Fruits.—Mainly stewed.

Fatty Foods.—Cream butter and olive oil.

Drinks.—Milk, buttermilk, cocoa, malted milk, Carlsbad and plain water.

Avoid rich soups, broths, fried foods, gravies, pork, bacon, hash, salted or smoked meats or fish, coarse vegetables, such as celery, radishes and cabbage, salads, hot breads, pastries, preserved and raw acid fruits and bananas, nuts, candies, cheese, strong tea or coffee and alcoholic stimulants.

Use tobacco in moderation, also avoid too hot and too cold food and drink. Use salt and pepper sparingly.

Diet After Appendicitis.—After a simple operation for appendicitis the same régime is carried out as in stomach and intestinal operations; fluids on the second day, soft diet on the third, and solid food of the simplest character and

prepared in the simplest way may be given on the fifth and sixth days. When, however, the operation has been of a more serious character, for example, when there was pus formation or a gangrenous appendix, the feeding by mouth must not be instituted for five days or more, nutrient enemas being used instead. Patients have been known to die from exhaustion after operations upon the stomach and intestines, not on account of the operation but on account of the lack of reserve power and endurance to carry them through the ordeal without a sustaining diet to overcome it. Under the circumstances Dr. F. Ehrlich [4] advises the following routine method: "So soon as the nausea from the anesthetic has worn off the patient gets tea, red wine, and gruel; on the day after the operation he is given sweetbreads in bouillon even if it nauseates him; if the nausea is persistent, his stomach is washed. On the second day finely chopped cooked squab, chicken, or veal, is added; on the third day, beef, potato purée and cakes; on the fourth, chopped (raw) ham, soft zwieback, and soft-boiled eggs. On the fifth, white bread and spinach. After the seventh day the meat is not chopped, and the patient returns gradually to normal diet. The bowels are regulated by oil enemas."

Diet After Operation upon Gall Bladder or Liver.— The dietetic treatment in these cases is like that of any other abdominal operation except for the character of the food. Fats are not well handled by the body of such individuals and should be eliminated as far as possible from the diet. Broths must be skimmed carefully to remove fat, and milk when given should be skimmed or given in the form of buttermilk or koumiss.

Diet After Operations upon the Kidneys.—The diet administered after operations upon these organs is logically one in which those foods which are entirely dependent upon

[4] "Diet in Health and Disease," p. 555, by Friedenwald and Ruhräh.

the kidneys for their elimination are restricted. In a former chapter the fate of the foods in metabolism was explained; the protein foods were seen to be the ones leaving the body chiefly by way of the kidneys and for this reason in the diet after operations upon these organs, as well as in that administered in disturbances affecting their functioning powers, this food constituent, the protein of meat in particular, must necessarily be restricted. The upsetting of the nitrogen equilibrium is for so short a period after kidney operations that this feature need not be considered here. The diet under the circumstances is essentially the same as that given during acute attacks of nephritis.

SUMMARY

Factors Affecting Diet before and after operations must be considered under two heads, namely, the character of the disease for which the operation is considered necessary and the general physical condition of the patient at the time.

Emaciation and Anemia are often encountered in patients having certain gastro-intestinal disturbances for which surgical intervention was found to be necessary. At times a preliminary up-building treatment is required before it is considered wise to submit the patient to the shock of so serious an operation.

Adjusting the Diet according to the character of the disease for which the operation is to be performed is most important. It is not always possible to build up the body beforehand, but in many cases it is necessary to make the effort. At times the reënforcing of the diet and a certain amount of gentle massage will enable the patient to pass through the trying ordeal more comfortably than would otherwise be possible.

Selecting the Diet to conform to the character of the disease is as important a factor in the recovery of the patient as food itself. This selection is left largely to the

nurse, consequently it is necessary that she should understand just which foods are indicated or contraindicated under the circumstances, and adjust the diet after the abstinence period accordingly. For example, the diet fulfilling all the needs of a patient who has just undergone an operation for a broken leg might be highly injurious for a patient just operated upon for some disturbance of the liver or kidneys. The diet given after must be essentially like that given just before the operation, in order that the affected organ may have an opportunity to heal and return to its normal functioning power.

Gastro-intestinal Disturbances must be avoided, both before and after the operation. In the preliminary treatment, when every effort is being made to increase the strength and endurance of the patient, such disturbances do away with any gain brought about by judicious dieting. After the operation, attacks of indigestion not only cause pain and discomfort as a result of the gas formation, but may cause symptoms far-reaching and even dangerous in their effects. The diet, then, must be composed of the simplest food and prepared in the most careful manner, the amount of food given at a time must be small—it is wiser to feed the patient oftener than to run the risk of indigestion by giving more than can be readily handled by the already taxed digestive apparatus.

The Bowels must be kept open in the majority of cases. Peristalsis is stimulated by the giving of water and fruit beverages as soon as it is advisable to give anything by mouth.

Reënforcing the Diet is at times necessary in order that the patient's strength may be kept up. In such cases lactose, eggs and some of the predigested casein or beef preparations are found to be valuable.

Before the Operation the patient must be made ready to take the anesthetic. This is done by preventing an

accumulation of food in the intestinal tract. The day before the operation, then, it is necessary to limit the diet materially by giving food in small amounts. The light diets prescribed in acute conditions are as a rule suitable, unless otherwise indicated.

The Day of the Operation a cup of tea, coffee, or broth may usually be given, with a cracker, unless the operation is to be performed early in the morning, in which case the patient is given no food at all. Some physicians allow a glass of milk on the day of the operation, but this is left entirely to the physician in charge.

After Operation a period of total abstinence from both food and water is necessary in order not to increase or induce nausea and vomiting. As soon as these symptoms subside, unless otherwise indicated, a certain amount of hot, cold, or carbonated water may be given. After this, albumen water may form the first nutrient administered. Milk, broth and fruit beverages follow the giving of albumen water, after which the semi-solids, such as soft eggs, gelatin and milk soups, constitute the convalescent diet.

The Character of the Diet after the operation depends wholly upon the nature of the disease for which the operation was deemed necessary.

Diet After Gastro-enterostomy must be adjusted in order not to increase the acid content of the gastric organ, otherwise the delicate mucous linings of the intestines would be subjected to direct contact with materials which are irritating in character, owing to the fact that the mass passes through the new opening and has thus been deprived of the neutralizing agents found in the upper part of the intestinal tract. Under the circumstances milk, albumen water and fine cereal gruels are the best foods from which to formulate the diet after the necessary period of abstinence and fluid diet.

After Appendicitis, as a rule, no food is given for five

days in cases where there has been a pus formation and the appendix gangrenous. Otherwise the routine treatment diet is given—water, then albumen water, followed by broth, milk and fruit beverages, fine cereal gruels, etc.

After Liver and Gall-bladder Operations the character of the food must be considered. The fats are not well handled in such conditions and must be avoided as far as possible. Broths must be well skimmed and the milk fat free. Buttermilk and koumiss are probably the most suitable forms in which to give milk in these cases.

After Kidney Operations the work of elimination through kidney must be limited as far as possible in such cases. While it is impossible to rest the organ entirely, the giving of a proper diet under the circumstances will do much toward relieving the strain placed upon it. The protein foods, with the exception of milk, must be excluded from the diet. The régime practiced in acute nephritis gives the most satisfactory results.

PROBLEMS

(*a*) Write a diet order for patient operated upon for gastric ulcer.

(*b*) Formulate a diet to be used after a gall bladder operation.

(*c*) Outline diet used after operation upon the kidney.

CHAPTER XVII

URINALYSIS

The importance of the kidney functions has been clearly demonstrated. Urine, which is the fluid secreted by these organs, is one of the most important sources of information, not only as to the manner in which the body utilizes food in health, but as an index to certain pathological conditions, the processes of which are more or less indicated by the products excreted in the urine.

Function of the Kidneys. — The kidneys, as has already been stated, furnish a means by which the greater part of the waste products of the body are eliminated and in addition to this function they adjust the salts in the body. In an early chapter the function of the salts in food was explained. A certain amount of these substances, we know, is absolutely necessary to carry on the work in the body, but harm comes when a surplus is retained in excess of that which can be used in performing the various processes. Consequently the function of the kidneys to adjust the salts balance is by no means their least important one.

Elimination of the Toxins. — The toxic substances manufactured in the body and those resulting from bacterial action upon unabsorbed proteins are likewise eliminated in the urine. Thus it can be readily understood how necessary it is to keep these organs in good repair, that they may continue their work in an efficient manner.

It is necessary from a pathological standpoint for the nurse to understand the making of some of the simpler tests, that she may simplify her own work and that of the physician.

Excretion of Carbon Dioxide and Water.—We have already spoken of the combinations of carbon and hydrogen compounds. These substances being oxidized, the carbon dioxide produced is eliminated by way of the lungs and the water is excreted partly by way of the lungs and skin, but chiefly by way of the kidneys.

Oxidation and Excretion of Nitrogenous Substances.—When the nitrogenous substances are oxidized, the used-up nitrogen products are eliminated by the kidneys in the form of urea and more or less highly oxidized substances, such as ammonia and other salts, purin bases, and creatinin.

Uric Acid, the chief of the oxidation products of nucleoproteins, is produced in the body and from food, and is always in the urine, being one of its normal constituents. It is only when this substance is in excess in the urine that a pathological condition is indicated.

Examination of the Urine, then, is made for several different purposes: (1) to ascertain whether the kidneys are doing their work properly; (2) to find if the kidneys, or any part of the urinary tract, are either temporarily or permanently diseased; (3) to be able to judge from the various substances in the urine whether there is any abnormal process taking place in the body.

Tests. — In the examination of the urine for the above purposes, certain definite tests are made. These tests differentiate between the abnormal and the normal.

(1) Color.
(2) Amount in twenty-four hours.
(3) Odor.
(4) Specific gravity.
(5) Reaction, acid or alkaline.
(6) Albumen, indican, acetone bodies.
(7) Sugar.

(8) Microscopic examination for casts, cells, bacteria, etc.

The Color of normal urine varies, especially with the amount voided.

The variations in color range from the pale straw color of individuals who are voiding large quantities to the deep lemon or amber of those who void much less.

Pathological conditions are indicated to a certain extent by the color of the urine. Fevers heighten the color, small quantities of blood cause a smoky appearance, while bile changes the color of the urine to a greenish yellow.

Precipitates in the Urine. — When the urine has been allowed to stand for a time there is sometimes a brick-red deposit due to the precipitate of urates. This disappears upon heating and is not an evidence of any diseased condition.

Turbidity of Urine. — The turbidity of fresh urine then is the only kind which need be considered, since standing in the cold often brings about this condition, due to the growth of bacteria and deposits of both phosphates and urates.

Requirements in Testing Urine. — Urine to be tested should be fresh, and when it is not possible to make the examination at once it should be preserved with chloroform, or some other harmless preservative, until ready to use.

Bacteria in Urine. — The changes due to bacterial growth in the urine are manifested not only by the turbid character of the urine but also by the odor of ammonia.

The Amount of Urine. — The amount of urine voided in twenty-four hours varies with the individual in health as well as in disease. Many individuals void a great quantity during the twenty-four hours, chiefly because they drink a great quantity of water and other beverages. The average amount of urine passed in twenty-four hours by an

adult, or a child over eight years, is from 1000 to 2000 c.c. It represents from 60% to 70% of the amount of water ingested.

Collecting the Urine for Testing.—In measuring the urine it is necessary to begin collecting it after the bladder has been emptied the first thing in the morning. The patient should void just before the end of the twenty-four-hour period to be sure that the amount formed by the kidneys during this time is accounted for.

Diseases in Which Urine Is Diminished. — In certain diseases the amount of urine passed is diminished. This is found to be true in diarrhea and dysentery, when water is lost in the feces, in hemorrhage from any part of the body and from vomiting. It is likewise at times the case after abdominal operations and in nervous conditions, such as hysteria. The urine is diminished when there is an organic obstruction in the urinary tract and certain obstructive diseases of the heart, the lungs and the liver. In these latter cases, there is seen to be a retention or suppression of urine. In both acute and chronic nephritis and in certain fevers, the bladder at times must be emptied by means of a catheter. At other times, the condition is relieved as far as possible by limiting certain articles of food in the diet. At any rate, these points must be kept in mind when examining the urine.

Effect of Food upon the Urine. — The odor of normal urine is changed after eating certain foods, such as onions and asparagus. In disease, the odor of urine has a distinct value as a means of diagnosis; cystitis gives a foul odor, certain bacteria bringing about a decomposition in the urine and giving rise to an odor of putrefaction. In cases where there is a fistula connecting the bladder and rectum, the urine has a fecal odor.

Specific Gravity of Normal Urine. — The density or specific gravity of urine means the weight of any volume of

urine as compared with that of equal volume of distilled water. The specific gravity of normal urine varies from 1012 to 1024, that is, in a thousand cubic centimeters of urine there are found from 11 to 18 grams of solid material. In health it is necessary to know the amount of urine passed in twenty-four hours, to be able to judge whether the amount of solids is too high or too low.

Specific Gravity of Diabetic Urine.—In conditions like diabetes mellitus, where there is a wastage of sugar taking place in the body—that is, instead of being oxidized to carbon dioxide and water the sugar glucose is passing into the urine without completing its oxidation — the specific gravity rises in these cases to 1030 and over, showing distinctly that a greater amount of solid material is in the urine than is present normally. In chronic Bright's disease and diabetes insipidus, the specific gravity is low.

Method of Determining Specific Gravity. — The specific gravity is determined by the use of an instrument known as a urinometer. The urine is poured into a tube and the urinometer is dropped into it. The different figures are marked upon the stem of the instrument and it is a simple matter to read off the figures of the level to which the stem sinks.

Reaction to Litmus. — In a former chapter it was stated that normal urine was, as a rule, acid, that is, it turns blue litmus red. Certain diseases render the urine alkaline. A like result is brought about upon the ingestion of sodium citrate or bicarbonate of soda. Urine which stands and becomes decomposed is alkaline in reaction, due to the bacterial action, with the production of ammonia.

Albumen in the Urine. — The presence of albumen in the urine is important, since normal urine does not contain this material in quantities sufficient to be recognized by ordinary tests. Hence in disease its presence is an indication of pathological processes taking place either in the

kidney or the urinary passages. The chief abnormal condition indicated by the presence of albumen in the urine is nephritis. Traces of albumen may occur in patients with fever or a heart weakness. Blood and pus in the urine likewise indicate albumen. When the nephritic condition is chronic, the kidneys themselves are diseased and the presence of albumen may be in traces only, while during the acute attack large quantities may be passed, but the urine will clear up after a time.

Benedict's Qualitative Sugar Test.—Boil 5 c.c. of Benedict's solution; add 8 drops of urine to be examined; hold the tube over the flame and allow to boil vigorously for 3 minutes and set aside to cool of itself. In the presence of sugar the entire solution will be filled with a precipitate which may be greenish, yellow, or red, according to the amount of sugar present. When the percentage of sugar is low (under 0.3%) the precipitate will form only upon the cooling of the solution. If there is no sugar present, the solution will either remain clear or show a slight turbidity, due to the precipitation of urates. The nurse must remember that to be useful the test must be made accurately. There must never be more than 10 drops of urine and 8 drops is the usual quantity. The boiling must be vigorous and the solution allowed to cool spontaneously.

QUANTITATIVE TEST FOR SUGAR

Benedict's Test.[1]—The simple quantitative test for sugar is the one devised by Benedict. This is simpler than the polariscopic examination and better suited for ordinary use.

Place 5 c.c. of Benedict's quantitative solution in a small dish, add a little less than one-fourth of a teaspoonful of sodium carbonate and one-eighth of a teaspoonful of talcum and add 10 c.c. of water. Dilute urine (1 part

[1] "Treatment of Diabetes Mellitus," pp. 182-183, by Joslin.

urine to 9 parts water) except where the qualitative test showed a low percentage of sugar, that is, when the precipitate turns green instead of yellow, in which case it will be unnecessary to dilute the urine. Place dish over burner and bring the contents to a boil. Pour the urine into a graduated pipette. Now add the urine drop by drop to the contents in the dish until the blue color entirely disappears. This test should be done over several times to assure an accurate calculation. The calculation is made as follows: 5 c.c. of Benedict's quantitative copper solution are reduced by 0.01 gram of glucose, consequently the quantity of undiluted urine required to reduce 5 c.c. Benedict's solution contains 0.01 gram of glucose.

$$\frac{0.01}{x} \times 100 = \text{per cent.} \quad x = \text{c.c. of undiluted urine.}$$

Example: 1500 c.c. urine in 24 hours.

5 c.c. used to reduce (decolorized) Benedict's solution.

$$\frac{0.01}{5} \times 100 = 0.2 \text{ per cent.}$$

1500×0.002 (0.2 per cent) $= 3$ grams of sugar in 24 hours.

Example: If the urine had been diluted with 9 parts water, in other words, 10 times, the calculation would be 5 c.c. diluted urine=0.5 c.c. actual urine.

$$\frac{0.01}{0.5} \times 100 = 2 \text{ per cent.}$$

1500×0.02 (2 per cent.) $= 30$ grams of sugar in 24 hours.

Hill and Eckman perform the Benedict's quantitative test as follows: [2]

[2] "Starvation (Allen) Treatment for Diabetes Mellitus," by Hill and Eckman.

Measure with a pipette 25 c.c. Benedict's solution into a porcelain dish, add 5 or 10 grams approximately of solid sodic carbonate, heat to boiling, and while boiling, run in urine until a white precipitate forms, then add urine more slowly until the last trace of blue disappears. The urine should be diluted so that not less than 10 c.c. will be required to amount of sugar which 25 c.c. of reagent is capable of oxidizing.

Calculation: 5 divided by number of cubic centimeters of urine run in equals per cent. of sugar.

Fermentation Test for Quantity of Sugar in Urine.—If the urine is 70° F. (room) temperature when the specific gravity is taken at both the beginning and end of the test, it will assure accuracy.

To 100 c.c. of urine of known specific gravity, add one-fourth of fresh yeast cake thoroughly broken up. Mix thoroughly and set aside at a temperature between 85° and 95° F. for twenty-four hours, after which time test with Benedict's or Fehling's solutions. If reduction is obtained, it will be necessary to allow the fermentation to continue until it is complete. When no further reduction is obtained, the specific gravity is taken after the urine has reached a temperature of 76°. The difference in the specific gravity at the beginning and end of the test multiplied by 0.23 gives the percentage of sugar in the urine.

The following formulas represent the various solutions used in the above test:

Benedict's Qualitative Solution

	Gm. or c.c.
Copper sulphate (pure crystals)	17.3
Sodium or potassium citrate	173.0
Sodium carbonate (anhydrous)	100.0
Distilled water to make	1000.0

Fehling's Solution

(1) Copper Sulphate Solution:

34.65 grams copper sulphate dissolved in water and sufficient water added to make 500 c.c.

(2) Alkaline Solution:

125 grams potassium hydroxide.

173 grams Rochelle salts dissolved in water q.s. to make 500 c.c.

Keep solution in separate bottles and mix in equal quantities when ready to use.

Haine's Solution

Copper sulphate (pure) .... 30 grams
(dissolved in ½ oz. (15 c.c.) distilled water)

Add ½ oz. pure glycerin, mix thoroughly, and add 5 oz. liquor potassæ.

Benedict's (Quantitative) Solution

Copper sulphate (pure crystals)	18 grams
Sodium carbonate (crystallized) (or 100 grams of anhydrous salt)	200 grams
Sodium or potassium citrate	200 grams
Potassium sulphocyanide	125 grams
5% solution of potassium ferrocyanide	5 c.c.

Distilled water to make total volume of 1000 c.c.

Dissolve the carbonate, citrate, and sulphocyanide with the aid of heat and enough water to make 800 c.c. of mixture. (Filter, if necessary.) Weigh exactly the copper sulphate crystals and dissolve in 100 c.c. of water, now add it to the first solution; stirring constantly. Add the ferrocyanide solution; cool and dilute to exactly 1 liter.

50 mg. (0.050 gm.) of sugar will reduce 25 c.c. of the above solution.

Gerhardt's Ferric Chloride Reaction for Diacetic

Acid.[3]—To 10 c.c. of fresh urine, add carefully a few drops at a time of undiluted aqueous solution of ferric chloride U. S. P. A precipitate of ferric phosphates first forms, but upon the addition of a few more drops of the same solution it is dissolved. A Burgundy red (red wine) color is obtained in the presence of diacetic acid. The depth of this color is indicative of the quantity of acid present. Joslin[4] records the intensity of the reaction as follows, +, ++, +++, or ++++.

According to Joslin, it must be remembered that similar reaction is obtained in the urine of individuals taking salicylates, antipyrin, cyanates, or acetates, but it is a simple process to differentiate between the color produced as a result of diacetic acid and that produced by the above-mentioned drugs. If the solution is boiled for two minutes, the color from diacetic acid will disappear, owing to the unstableness of that substance, while that from the drugs will remain unchanged.

Test for Acetone.—Pour 5 c.c. of urine to be tested into a test tube, add a crystal of sodium nitroprusside, acidify with glacial acetic acid, shake well, and then make alkaline with ammonium hydrate. The presence of acetone is indicated by a purple color.

TESTS FOR ALBUMEN

The heat test[5] is the simplest. This consists of first filtering the urine through filter paper, then pouring some of the clear urine into a test tube, holding the test tube in a flame so that only the upper layer boils, then adding a few drops of 2% solution of acetic acid and boiling again. If there is albumen present, a very faint, or a heavy cloudiness (precipitate of coagulated albumen) forms on boiling and persists or becomes heavier on the addition of a few drops

[3] Rothera test for Acetone, see Chapter xx.
[4] "Treatment of Diabetes Mellitus," p. 186, by Joslin.
[5] "Chemistry for Nurses," by Reuben Ottenburg.

of dilute acetic acid (2%) and boiling again. If a precipitate occurs at the first boiling, but clears up again entirely on adding acetic acid, it is not albumen but harmless phosphates or carbonates.

HELLER'S TEST FOR ALBUMEN

Into a test tube pour a few drops of nitric acid, filter the urine and allow a small quantity of it to trickle from a pipette down the side of a test tube until it comes in contact with the acid. If albumen is present a distinctly formed white ring is seen at the zone of contact.

TEST FOR INDICAN

This material is found in cases of obstinate constipation and in other intestinal disturbances where the passage of the food mass in the small intestines is delayed and the putrefactive bacteria exert their activities upon the unabsorbed protein.

Test.—Mix equal quantities of urine and fresh hydrochloric acid and add drop by drop fresh concentrated solution of chloride of lime (5 to 1,000). Indican is indicated by the appearance of a blue color.

SUMMARY

Urinalysis represents one of the most important means for determining the health of an individual, since it is the urine that shows those substances produced in the body as a result of the breaking down of the body tissues and protein foods.

Composition of Normal Urine must be familiar to the nurse in order that she may recognize any change taking place in the urine of her patient which may indicate pathological conditions in the body.

The Specific Gravity of urine is one of the points by

means of which the presence of certain substances more or less abnormal in character is determined.

Other Points, such as color, odor, quantity, reaction, and chemical composition, likewise show any deviation from the normal in the individual.

Urine Tests are necessary to determine the composition of the secretion. The character of these tests and the methods used in making them form an essential part in the training of the nurse.

Tests for the presence of albumen, sugar, and possibly indican in the urine, should be made by the nurse. The latter substance represents the extent of putrefaction taking place in the body and for this reason should be included in the urine tests.

Collecting the Urine for testing is important. The amount includes all that has been voided throughout the entire twenty-four hours beginning after the bladder has been emptied on the first morning and ending after the first specimen has been voided on the morning of the second day.

Preserving the Urine for testing is usually necessary, especially during the warm weather. The specimens should be collected in a wide-mouthed sterile glass jar. This should be kept in a cold place. Some harmless preservative such as chloroform should be added to assure its keeping.

PROBLEMS

(*a*) Outline tests used in urinalysis; state when they are used.
(*b*) List the equipment needed for making the simple tests.
(*c*) Make tests in laboratory and list results in note-book.

CHAPTER XVIII

RENAL VASCULAR DISEASES

Nephritis, Nephrosis, Hypertension

To be in a position to intelligently carry out a physician's directions regarding the dietetic treatment of any therapeutic condition, the nurse should have some knowledge of the disease itself, and to understand the fundamental principles which underlie and more or less influence its dietary management. This is especially true of diseases whose treatment calls for a weighed diet.

Under this head may be placed diseases of the renal vascular system, nephritis, nephrosis, and hypertension.

These disturbances may be divided into three groups:

(1) The degenerative type, or true nephrosis;
(2) The inflammatory type, or pure nephritis;
(3) The sclerotic type, under which comes benign or essential hypertension.

These disturbances each showing distinctive symptoms but like many allied diseases in other parts of the body, show an overlapping of symptoms, one type will develop the specific symptoms of one or both of the other types. Careful observation on the part of the nurse will enable her to grasp the fact that the physician in making the renal tests is using this means for obtaining additional light on the patient's condition to guide him in formulating the diet prescription.

A brief discussion of nephritis, nephrosis and hypertension will be included here.

1. **Nephrosis.**—True nephrosis is confined to the tubules of the kidney, and while the urine usually contains a large amount of albumin there is no hypertension and very little nitrogen retention. Edema is a marked symptom of nephrosis and as a rule there will also be found a secondary anemia.

2. **Nephritis.**—Pure nephritis is characterized by a retention of nitrogen, an increased blood pressure, and, in the late stages of the disease, by symptoms of myocardial failure evidenced by shortness of breath and edema.

3. **Scleroses.**—These are divided into two groups: (a) Benign or essential hypertension; (b) malignant hypertension. In the benign type of hypertension, if uncomplicated there is no renal impairment, consequently no nitrogen retention; but malignant hypertension, a condition which usually represents a combination of nephritis and sclerosis, as a rule is characterized by very high blood pressure, arterio-sclerosis, and nitrogen retention.

Nephritis

Symptoms of Nitrogen Retention.—The patient may develop one or more of the following symptoms: Headache, of the dull persistent type, characteristic of sick headaches; foul breath, coated tongue, bad taste in the mouth, and at times nausea and vomiting. Frequently constipation or diarrhea will develop, and in certain cases these symptoms will alternate. There is a gradual loss of weight and strength, due possibly to the inadequate food intake and indigestion which makes the taking of food objectionable. Impairment of vision due to retinitis is frequently complained of.

Symptoms of Uremia.—The principal symptoms, in addition to those mentioned above, may be divided into two groups: (1) nervousness, restlessness and sleeplessness, muscular twitching, convulsions; (2) drowsiness, depression,

apathy, mental impairment, stupor and finally coma. Death frequently occurs with both convulsions and coma.

Dietary Adjustment.—Protein restrictions are essential in order to prevent a retention of nitrogen. In severe acute nephritis, as well as in cases of chronic nephritis when the blood nitrogen is excessively high, there is always danger of uremia, consequently a diet must be administered in which there is no protein, or one in which the protein is very low (such as a diet made up of vegetables and fruit), (see Protein Free Diet, page 405). This diet is essentially low in calories, although an effort is made to spare the body proteins as much as possible mainly by the administration of carbohydrates with a minimum of fats. For this reason this diet should not be continued longer than a week or two. If there is too great an objection to the protein free diet, one containing from 10 to 15 grams of protein may be substituted (see page 404), the protein is increased or decreased from five to ten grams at a time until the desired amount is being taken daily; any return of the symptoms of nitrogen retention will call for an immediate return to the lower protein level.

When edema or hypertension is associated with nephritis it is necessary to restrict both the protein and the salt. A salt free diet is indicated under these circumstances.

Fluid Intake.—The fluid intake (water) in the majority of cases can be regulated by the demands of thirst, even when the salt is restricted. When the concentration power of the kidneys is impaired to any great extent, many physicians order three glasses (720 c.c.) of water in addition to those called for to relieve thirst. This is to increase the volume of urine in order to assist in the removal of accumulating nitrogen.

Sodium Chloride Deficiency.—It is safe in the majority of cases of renal vascular disturbances to reduce the sodium chloride (salt) intake to a point where the urinary chloride

excretion approximates 0.2 to 0.3 grams during the twenty four hours. These restrictions, as a rule, may be continued indefinitely without producing unfavorable results. However, in a certain number of cases of hypertension, the individual will show symptoms of a salt deficiency if the sodium chloride intake drops below 0.5 gram in twenty four hours.

Symptoms of Salt Deficiency.—The first evidence is a marked weakness accompanied by a loss of appetite. These symptoms are followed as a rule within twenty four hours by more or less severe prostration, headache, pain in the calves of the legs, irregularity or weakness of the heart, nausea and vomiting. These symptoms are not always the result of a deficiency in the salt intake, but may result from some other causes, hence it is best to make sure by administering 2 grams of salt (dissolved in water or soup), if they do not clear up within twenty four hours, they are not caused by a lack of salt in the diet. The treatment for the salt deficiency consists in giving a daily dose of 2 grams of salt (less if the salt tolerance is less than 2 grams per day), in which case the salt intake is raised a little at a time until the tolerance point is reached.

Acute Nephritis.—The milk diet is considered to give the maximum benefit with the minimum damage to the kidneys, in acute nephritis, this is on account of: (1) the small total intake of food, the total quantity per day being limited as a rule to from 600 to 800 c.c. (in some cases the amount is raised to 1000 c.c.); (2) the protein, while low in this amount of milk is of the best quality, furnishing a minimum amount of nitrogen to be eliminated as urea to the total protein and at the same time being free from uric acid, from purins and nucleoproteins; (3) because milk in proportion to its organic contents furnishes more nourishment than any other food material. The sodium chloride content of milk (.16 per cent), is sometimes used

as an argument against its use, but in the small amount of milk allowed daily both the sodium chloride as well as the creatinin, which milk undoubtedly contains, the quantities are relatively small (0.9 gm. salt in 600 c.c. or 1.3 gms. in 800 c.c.). In acute nephritis with marked edema and hypertension even this small intake of salt may be objectionable. The alternative is the diet made up of fruit juices reinforced with lactose or dextri-maltose, and protein free cookies (see cornstarch cookies).

Karell Diet in Acute Nephritis.—The Karell diet is one of the best known of the milk diets. This is given either as a "strict" Karell diet or as a "Modified Karell Diet."

As a rule the strict form of Karell diet is administered for the first seven days. If the patient is progressing satisfactorily on the eighth day the diet is somewhat increased and the so-called Modified Karell diet is begun. The modification of this diet is not always the same; two examples are included here. In all cases should adverse symptoms appear an immediate return to the strict diet should be made.

As the patient's condition improves, a gradual increase in the amount of food given each day is made and more protein is added until the patient is receiving the amount required for maintenance.

The Standard or Strict Karell Diet

800 c.c. of milk given 200 c.c. at each feeding at 8 A.M., 12 M., 4 P.M and 8 P.M. this amount will furnish

Protein	26	grams
Carbohydrates	40	grams
Fat	32	grams
Sodium chloride	1.6	grams
Water	796	grams
Total Calories	552	

The fluid content of the No. 2 Modified Karell diet is not as high as that of the strict diet, consequently the patient may be allowed sufficient water to make up the difference. In the No. 1 Karell diet the fluid intake is the

same, but the method of administration, like that used in No. 2, is different.

Karell (Modified Diet)
Salt-free

Eighth Day.—Milk, 800 c.c. in four feedings of 200 c.c. each. This may be given at 7.30 A.M., 12 M., 4.30 P.M and 9 P.M., or it may be given at 8-12-4 and 8.

At 10 A.M. 1 soft-cooked egg and 1 slice of toast (20 gms.).

Ninth Day.—800 c.c. milk, in 4 feedings (part may be made into junket ice cream, and part in milk soup if desired).

10.00 A.M.	1 egg and 1 slice of toast.
12.30 P.M.	Milk soup (200 c.c. milk, 50 gms. veg. purée, 2 tsp. cornstarch).
4.30 P.M.	200 c.c. milk, 1 slice (20 gms.) toast.
8 or 9 P.M.	Milk, 200 c.c.

Tenth to Twelfth Day.—800 c.c. milk, 2 eggs, 2 slices toast, 100 gms. cooked rice (30 gms. raw), 1 serving (100 gms.) asparagus, celery, cauliflower or carrots. Prepared and distributed as described above.

Value, eighth day: Prot. 31 gms., coh. 51 gms., fat 37 gms., cal. 667. The salt content 1.78 gms.

Value, ninth day: Prot. 33 gms., coh. 62 gms., fat 42 gms., salt 1.89, cal. 740.

Value, tenth to twelfth days: Prot. 45 gms., coh. 89 gms., fat 42 gms., salt 2.41 gms.

Modified Karell Diet. (No. 2).[1]—The modified Karell diet allows more articles of food than the standard Karell diet, but the amounts of carbohydrates, protein and fat and total calories as well as the mineral content are approximately the same. The water content of the modified Karell

[1] Modified Karell Diet as used in St. Mary's Hospital, Mayo Clinic, Rochester, Minn. Courtesy of Miss Florence Smith.

diet, however, is somewhat lower. This difference the patient is allowed to drink during the day.

Breakfast

Bread (toast)	10 gm.
10% fruit (orange)	100 gm.
Sugar	5 gm.
Egg	1

Dinner

Bread	10 gm.
Cream soup	150 gm.
Butter	5 gm.

Supper

Bread	10 gm.
Milk	200 gm.
Butter	5 gm.
Egg	1

The diet is served salt free. The water content is 450 c.c., therefore, the patient is allowed 350 gms. or 1¾ glass water to drink.

LOW-PROTEIN DIET [2]

		Protein Grams	*Carbohydrates Grams*	*Fats Grams*
Breakfast:		6.7	160	51
Cooked Farina	(100 grams)	Total calories for day, 1192		
Butter	(20 grams)			
Fruit	(100 grams)			
Lactose	(30 grams)			
		200 grams of fruit juice served between meals		
Dinner:				
Asparagus	(100 grams)			
Butter	(20 grams)			
Fruit	(100 grams)			
Lactose	(30 grams)			
Supper:				
Carrots	(100 grams)			
Fruit	(100 grams)			
Butter	(20 grams)			
Lactose	(30 grams)			

[2] The above diets used in the Olmstead Hospital, Rochester, Minn. Courtesy of M. Foley and D. Ellithorpe, Mayo Clinic.

PROTEIN-FREE DIET

	Protein Grams	Carbohydrates Grams	Fats Grams
Breakfast:			
Protein-free cookies[3] . . (2)			
Fruit juice . . (100 grams)	0	183	54
Lactose . . . (15 grams)			
Dinner:			
Protein-free cookies . . . (2)	Total calories, 1218		
Fruit juice . . (100 grams)			
Lactose . . . (15 grams)			
Supper:	Each cookie weighs 24 grams		
Protein-free cookies . . (2)			
Fruit juice . . (100 grams)			
Lactose . . . (15 grams)			

Doctors Chase and Rose advise farina used more frequently than oatmeal, and the plain cream soup, rice or potato, more often than soups made of celery or asparagus (the latter used to break the monotony). They also advise the more frequent use of green string beans and asparagus in preference to other vegetables.

The adjustment of the diet in the majority of renal vascular disturbances are based on: Observation of general symptoms, kidney tests (renal function), blood and urinalysis.

Various tests for determining the character and extent of kidney damage have been devised. One of the functions of a normal kidney is the ability to concentrate and dilute the urine. Impaired or damaged kidneys lose to a greater or less degree this ability and can excrete a dilute urine only. The "Mosenthal Test" is the one used to test the function of the kidneys to excrete nitrogen and salt.

Renal Functional Tests.—The following schedule is used by Mosenthal, of the Johns Hopkins Hospital, in making what is known as the "Two-Hour Test for Renal Function":

[3] See Section of Recipes, p. 182.

HEDINGER-SCHLAYER MOSENTHAL DIET [4]

For......................

Date..............

All foods to be salt free from the diet kitchen, salt for each meal will be furnished in weighed amounts.[5]

All foods or fluids not taken must be weighed or measured after each meal and charted in spaces below. Allow no food or fluid at any time except at meal times.

Note any mishaps or irregularities that occur in giving the diet or collecting the specimens.

		Approx. Measures
Breakfast 8 A.M.:		
Boiled oatmeal .	100 grams	½ cup
Sugar 1 to 2 teaspoonfuls		
Milk	30 c.c.	2 T.
2 slices of bread	30 grams each	2 slices 3½″ x 3″ x ½″
Butter . . .	20 grams	4 tsp.
Coffee 160 c.c.	200 c.c.	⅔ cup
Sugar 1 teasp'ful		
Milk 40 c.c.		2 T. + 2 tsp.
Dinner—noon:		
Meat soup . .	180 c.c.	¾ cup
Beefsteak . .	100 grams	2 pieces 2½″ x 2½″ x 1″
Potatoes, boiled, mashed or baked	130 grams	⅔ cup
Green vegetables as desired		
2 slice bread—each	30 grams	2 slices 3½″ x 3″ x ½″
Butter . . .	20 grams	4 tsp.
Tea, 180 c.c.	200 c.c.	¾ cup
Sugar, 1 tsp.		
Milk, 20 c.c.		1 T. + 1 tsp.
Water . . .	250 c.c.	1 cup + 2 tsp.
Pudding, tapioca or rice . . .	110 grams	

Author has included the approximate measures to simplify the above test diet.

[4] Copied from "Medical Clinic of Chicago," Vol. II, No. 5, 1917.

[5] NaCl, 2 to 3 grams in a capsule accompanying each meal. Any salt unused is returned to the diet kitchen, where it is weighed and the amount used is indicated on the chart.

Supper 5 P.M.:		Approx. Measures
2 eggs cooked any style		
2 slices of toast	30 grams each	2 pieces 3½" x 3" x ½"
Butter . . .	20 grams	4 tsp.
Tea, 180 c.c.	200 grams	¾ cup
Sugar, 1 tsp.		
Milk, 20 c.c.		1 T. + 1 tsp.
Fruit, stewed or fresh	1 portion	
Water . . .	300 c.c.	1 cup + 4 T.

8 A.M. No food or fluid is to be given during the night or until 8 o'clock next morning (after voiding) when the regular diet is resumed.

Patient is to empty bladder at 8 A.M. and at the end of each period as indicated below. The specimens are to be collected for the following periods in properly labeled bottles:

8 A.M. to 10 A.M.; 10 A.M. to 12 Noon; 12 Noon to 2 P.M.; 2 P.M. to 4 P.M.; 4 P.M. to 6 P.M.; 6 P.M. to 8 P.M.; 8 P.M. to 8 A.M.

Chart Used in Johns Hopkins Hospital.—The following chart is inserted here to show the method used in the Johns Hopkins Hospital for carrying out the Two-hour Renal Test:

Time of Day	*Urine*		*NaCl*		*Nitrogen*	
	C. C.	*Specific Gravity*	*Per cent*	*Grams*	*Per cent*	*Grams*
8 A.M.–10 A.M.						
10 A.M.–12 Noon						
12 Noon–2 P.M.						
2 P.M.–4 P.M.						
4 P.M.–6 P.M.						
6 P.M.–8 P.M.						
8 P.M.–8 A.M.						
Total day . .						
Night, 8 P.M. to 8 A.M. . .						
Total 24 hours						
Intake of fluid						
NaCl . . .						

Urine to be collected punctually every two hours and kept in the ice box, every specimen having 5 c.c. of toluene added to insure preservation.

Creatine.—Probably the best indices of renal damage is the creatine content of the blood. Normal blood contains about 3 to 5 mg. per 100 c.c. When the blood shows an excess of over 5 mg. per 100 c.c. this prognosis is grave, except in acute nitrogen retention.

Adjusting the Nephritic Diet for Individuals.—A diet plan by means of which the protein, calories, salt and fluids may be adjusted to meet the requirements of individual patients seems advisable. After the tests are made to determine the individual's ability to excrete nitrogen, etc., the physician then determines the individual's calorie and protein requirements and adjusts the diet to meet these needs. Protein in form of meat, eggs and cream; fats in form of butter and mayonnaise, and carbohydrates in form of jellies and jams can be added to fill the prescription.

Adjusting the Protein.[6]—The following outline may be used to adjust the nephritic dietary to meet the needs of individual patients. The diet contains: 20 grams of protein is low in calories and fluids.

Fruits.—Fresh or canned. Two 100 gram portions of 10% fruit; two 100 gram portions of 15% fruit; one 100 gram portion of 20% fruit. (See table.)

Preserves Marmalade Jelly, jam Honey Syrups	As desired or ordered, these sweets must be regulated by the number of calories ordered.

Milk.—Limited to one half a glass (120 c.c.) per day. This includes the milk used in cooking.

[6] Courtesy of Miss Mary Foley, Kaler Hospital, Mayo Clinic, Rochester, Minn.

Cream.—Limited to one half a glass (120 c.c. or ½ standard measuring cup).

Bread or Toast.—Limited to 2 average slices (60 grams) salt-free bread only. No pan cakes or waffles.

Butter.—As desired or ordered.

Soups.—Cream soups, if milk or cream in diet is used; vegetable soups made without meat stock (see rule). *Avoid* meat soups, broths and meat gravies.

Vegetables.—1 small baked potato daily. 1 large serving of 5 or 10 per cent vegetable twice daily (use canned vegetables if fresh vegetables are not available). To use the canned vegetables, pour off the water in which vegetables have stood, add fresh water, cook five minutes, drain off this water and add fresh water and reheat. *Avoid all condiments and highly spiced foods.*

Salads.—Use fruits from those allowed for the day. Use vegetables from those allowed for day. Use a simple mayonnaise or French dressing made with oil and lemon juice.

Beverages.—Fruit juices if calories and fluid content of diet permits. Postum or kaffee hag, sugar as required to make beverages palatable. If cane sugar disagrees, lactose may be substituted.

To raise the 20 grams protein diet to a 30 grams protein diet add the following:

30 grams of protein.

To above diet add:

Milk.—One half glass (120 grams).

Bread.—1 average slice (30 grams).

Cereal.—3 tablespoons, cooked cereal.

To raise the 30 grams protein diet to 40 grams protein diet add:

40 grams of protein.

Milk.—One half (½) glass or 120 c.c.

Desserts.—1 serving (about 2 tablespoons) of such desserts as:

Rice with raisins	Jello
Rice with fruit	Ice cream
Fruit tapioca	Water ices
Fruit gelatins	Sherbets

Or small white cookies

This form of dietary adjustment is convenient since it shows the chief foods in the amounts required, leaving the rest to be adjusted to the needs of the individual patient.

If it is desirable to substitute eggs for a part of the protein the addition is quickly made since the protein content of the egg is known.

In a certain number of cases it is necessary to force fluids and give a very low protein diet with sufficient calories to meet the needs of the patient.

The following sample menu is an example of such a diet:

The calories are sufficient for maintenance (2380). The protein content of the diet is 21 grams. The sodium chloride content is likewise low.

Breakfast:

Orange juice (150 c.c.) with lactose 1 T., farina with cream (3 T. with T. cream), cocoa.

10 A.M.:

Orange or grape juice (150 c.c.) with 1 T. lactose.

Luncheon:

Vegetable soup (nephritic) 1 service, buttered asparagus, candied sweet potato, lettuce and tomato salad, lemon sherbet.

3 P.M.:

Fruit juice combination (150 c.c.) with 1 T. lactose.

Dinner:

Baked potato with butter, buttered carrots, grapefruit salad (or head lettuce), pineapple charlotte (30 gms. grated pineapple, 60 gms. XX [40%] cream,

1 T. lactose sugar to sweeten, about 1 T.), grape juice with ginger ale (150 c.c.).

9 P.M.:

Orange juice (150 c.c.).

In the above diet the beverages are made by measuring the fruit juice, adding the lactose then adding water or ginger ale to bring the quantity up, from 180 to 200 c.c.

It is important that the fuel value of the diet be kept constant. In diets necessarily carried on over an extended period of time it is important to give as much variety of choice as possible to prevent the breaking of diet which occurs when the daily menu has grown monotonous. The following tables of substitutes are included to obviate this possibility, especially in chronic conditions.

DIET SUBSTITUTES [7]

Carbohydrate Equivalents.—Substitute for 1 slice of bread, 20 grams

3 average servings (300 gms.) of 5% vegetables.
1 2/3 serving (166 gms.) of 10% vegetables.
1/2 serving (50 gms.) of 20% vegetables.
1 serving (100 gms.) of 10% fruit.
2/3 serving (66 gms.) of 20% fruit.
1/2 serving (12 gms.) dry cereal.
1 slice (20 gms.) of rye bread.
1 slice (20 gms.) of whole wheat bread.

Fat Equivalents.—It is often convenient and sometimes necessary to use substitutes for butter. The following list is suggested:

Substitutes for 1 square (10 grams) of butter

2 teaspoonfuls of salad oil	9 grams
2 teaspoonfuls of mayonnaise	12 grams
1 1/2 strips of bacon	15 grams

[7] The above list of substitutes arranged by Miss Florence Smith, St. Mary's Hospital, Mayo Clinic, Rochester, Minn.

2 tablespoonfuls 40% cream ....25 grams
¼ glass 20% cream ....50 grams

Protein Equivalents.—When planning diets it adds variety to occasionally substitute meat or other foods having a food value of 6 grams of protein and 6 grams of fat when 1 egg is allowed in the diet.

Substitutes for 1 egg

1 inch cube Am. cream cheese.
1 glass (200 gms.) of milk.
1 cup (200 gms.) of cream soup.
1 serving (100 gms.) ice cream.
1 serving (100 gms.) custard.
1 serving (25 gms.) lamb chop (lean).
1 serving (33 gms.) of boiled ham.

The following foods contain varying amounts of carbohydrates and fat. The protein in the servings indicated equals the protein in 1 egg. The carbohydrate may be disregarded, but the fat should be adjusted by omitting butter from the diet as indicated.

20 almonds (30 grams) deduct........	2	squares butter
6 Brazil nuts (36 grams) deduct......	2½	squares butter
¾ oz. butternuts (23 grams) deduct...	2½	squares butter
18 halves English walnuts (37 grams) deduct	2½	squares butter
20 pecans (60 grams) deduct.........	5	squares butter
15 peanuts (A. P. 30 grams) deduct...	1	square butter
1 oz. Hickory nuts (35 grams) deduct.	2½	squares butter
40 Filberts (40 grams) deduct........	2½	squares butter

When arranging diets of low protein and salt content it is advisable to keep the meals as simple as possible, the beverages allowed are kaffee hag and postum, the sugar in such beverages should be *limited to 2 lumps.* 1 teaspoonful of sugar only on cereal unless a smaller quantity than allowed has been used in beverage.

The desserts allowed should be made of fruits when puddings such as tapioca, bread pudding, etc. are used care should be used to see that no more than 2 grams of protein are contained therein (in a diet allowing 40 grams of protein).

HYPERTENSION

Definition.—Hypertension is an elevation of either the systolic or the diastolic blood pressure above the normal. When the term "blood pressure" is used it is to the systolic pressure to which one refers.

Systolic Pressure.—A knowledge of the significance of the systolic pressure is important (1) because it represents the maximum strain or pressure placed upon the blood vessels when they receive the full force of cardiac impulse; (2) because we are accustomed to look upon the systolic blood pressure as an index to the functioning powers of the heart.

Diastolic Pressure.—Represents the minimum pressure upon the arterial walls, between heart beats, it also represents the constant strain which the heart muscles must overcome in order to open the aortic valves.

Factors Determining the Normal Blood Pressure.—Sex, age, muscular activity, nervous condition or temperament of individual, are all factors bringing about variations in the so-called normal blood pressure.

Exercise.—Muscular exercise temporarily increases the blood pressure even in normal individuals, the working muscle calls upon the heart for an increased blood supply, the heart quickens its beat in order to pump additional blood into the arteries, the arterioles and capillaries in the muscle tissue dilate to accommodate the extra intake of blood, the increased heart impulse causes a rise in the blood pressure (at times as high as 200 mm. is registered at the height of the heart impulse. This fact becomes significant

when there is an impairment in the kidney functions or arterio-sclerosis.

Normal Blood Pressure.—Barker [8] suggests the term "average" rather than "normal" when applied to the blood pressure, and offers Woley's figures based upon the examination of 1000 individuals.

Age	15-30	31-40	41-50	51-60
Average systolic pressure ..	122	127	130	132

Allen [9] considers a blood pressure of 140 mm. abnormal at any time of life, he states "This arbitrary estimate is open to dispute, but on the other hand, few will deny that a pressure of 140 mm. in any person below the age of 35 is abnormal, and in a child it is serious.

Symptoms of High Blood Pressure.—Unfortunately the symptoms of a decided increase in blood pressure do not always appear as soon as the elevation occurs, in many cases the condition has been present for months and at times years. The first symptoms that manifest themselves are, however:—headache, of a throbbing, pounding character; dizziness, weakness, nervousness, shortness of breath, indigestion. When the condition is prolonged the skin in many cases becomes pale and the features drawn, this is the type of hypertension which we find associated with nephritis. In other cases the skin becomes florid, this is the type most frequently met with in the hypertension associated with obesity; Constipation is one of the common accompaniments of most cases of hypertension.

Infection.—There is no doubt of the damage done by infection in individuals suffering from hypertension, this damage may be temporary on the other hand it may be severe and lasting. Infections from bad teeth, tonsils, grippe, flu, etc., such receive immediate attention.

Test Diets are used in determining the dietary require-

[8] Lewellys E. Barker and Normal B. Cole, "Blood Pressure: Cause, Effect, and Remedy," p. 51.
[9] "Kidney Diseases," F. M. Allen, M.D.

ments in hypertension cases as in nephritis. These test diets, like the Mosenthal Test for Renal Function, consist in feeding known quantities of protein and salt, until the tolerance point is determined, and the diet adjusted to keep within these limits. For example, if a patient is able to eat a large amount of protein without an abnormal increase of urea, (or non-protein nitrogen) in the blood, the nitrogen excretion is satisfactory and there need be no restriction of protein, except as a precaution against possible future damage. If however, the protein intake is restricted to 20 or 30 grams or a protein free diet is instituted and the patient's blood does not show a tendency to return to somewhere near normal so far as blood urea is concerned, the nitrogen function is seriously impaired and the patient stands in great danger of uremia.

The same type of test is used to determine the need for sodium chloride restriction; If no edema or hypertension appears when the patient is fed an unlimited amount of salt there is no need of salt restriction. However if there is edema or hypertension which only improves under a very low or salt free diet the function is distinctly impaired and the salt restrictions should be persisted in over an extended period and in some cases for ever. Drs. Sansum, Blatherwick, and Nazum, of the Potter Metabolic Clinic, Santa Barbara, California, as a result of extensive research in Nephritis and Hypertension, offer another theory as to the cause of hypertension and suggest a dietary treatment in accordance with this theory (Santa Barbara Cottage, Hospital, Research Dept., Santa Barbara, Calif.)

"A CHEMICAL THEORY AS TO THE CAUSE OF HIGH BLOOD PRESSURE

"We believe that the blood vessel changes which are responsible for high blood pressure are due, in part at least, to a diet error in which the acid-ash foods are consumed

in excess of the alkaline-ash foods. We believe that this in turn results in a slight decrease in the very delicate balance of the body with the resulting blood vessel damage. We believe that the changes take place slowly over perhaps years of time.

In explanation, the acid-ash foods are the cereals and meats, including fish, shell fish, fowl and eggs. The alkaline-ash foods are fruits, vegetables, nuts and milk. The neutral-ash foods are the pure starches, sugars, and fats. We believed that a normal diet should be balanced to include a sufficient amount of the alkaline-ash foods to neutralize all of the acid ash foods used."

In order to facilitate the arrangement of the diet, based on Drs. Sansum and Nazum's theory, the following list of foods showing the acid and alkaline content of common foods is included.[10]

TABLE I

Acidity of Certain Foods
Per 100 Grams

Bread, white	2.7
Bread, whole wheat	3.0
Corn, sweet dried	5.95
Crackers	7.81
Cranberries	*
Eggs	11.10
Egg white	5.24
Egg yolk	26.69
Fish, haddock	16.07
Fish, pike	11.81
Meat, beef, lean	13.91
Meat, chicken	17.01
Meat, frog	10.36
Meat, pork, lean	11.87

[10] Sherman and Gettler, Jour. Biol. Chem., 11: 325, 1912, and tested in man by Dr. Blatherwick, pub. in Arch. Int. Med. 14: 409 (Sept., 1914).

Meat, rabbit	14.80
Meat, veal	13.52
Oysters	30.00
Oatmeal	12.93
Peanuts	3.9
Prunes	*
Rice	8.1

* The ash of these foods is alkaline, but because of contained substances which form hippuric acid in the body, they increase the acidity of the urine.

Table II

Alkali Producing Foods
Per 100 Grams

Almonds	12.38
Apples	† 3.76
Asparagus	.81
Bananas	† 5.56
Beans, dried	23.87
Beans, lima, dried	41.65
Beets	10.86
Cabbage	4.34
Carrots	10.82
Cauliflower	5.33
Celery	7.78
Chestnuts	7.42
Currants, dried	5.97
Lemons	5.45
Lettuce	7.37
Milk, cow's	2.37
Muskmelon	† 7.47
Oranges	† 5.61
Peaches	5.04
Peas, dried	7.07
Potatoes	† 7.19
Radishes	2.87
Raisins	23.68
Turnips	2.68

† These foods have been found experimentally to be very efficient in reducing the acidity of the urine.

Table III

A Basic (Alkaline) Diet as Served

Breakfast:
- Baked apple with cream.
- 1 glass orange juice.
- ½ slice toast.
- 1 glass milk.

Lunch:
- Baked stuffed potato, ½ slice bread.
- Combination vegetable salad, olives.
- Beets in cream, butter, 1 glass milk.
- Iced cantaloupe, 1 glass orange juice.

Dinner:
- Cream of spinach soup, escalloped potatoes, buttered peas and carrots.
- California fruit salad, ½ slice bread.
- Butter, 1 glass orange juice, 1 glass milk.
- Apricot ice cream, raisins, nuts.

Teaching Notes

1. A fruit served with cream is used as a substitute for breakfast cereal.
2. Three half slices of toast may be served at breakfast and bread omitted at dinner and lunch.
3. Cornstarch is used as thickener for cream soups, etc.
4. Lemon juice is substituted for vinegar in salad dressings.
5. Fat in form of butter, cream, olive oil, etc., is used in quantities to regulate the body weight.
6. The bulk of the diet is regulated to produced a normal bowel movement each day.

Sample Menu Showing Dietary Management with Alkaline Basic Foods

Breakfast:
- Sliced peaches with cream, bacon.
- Soy bean muffins, butter, raspberry jam.
- Glass of milk or cup of cocoa.
- Glass of orange juice.

Dinner:

Cream of onion soup.
Browned potatoes, creamed cauliflower.
Parsnips, Waldorf salad, soy bean muffins.
Butter, orange juice (1 glass).
Apricot ice.
Glass of milk.

Supper:

Cream of pea soup.
Potatoes au gratin, buttered string beans.
Soy bean muffins, butter.
Tomato and asparagus salad.
Canned figs, raisins.
Glass of orange juice, glass of milk or cocoa.

Certain foods are neutral in reaction, these foods may be used as desired by the patient unless otherwise directed by the physician. The Neutral Foods Are:—Butter, Cream, Olive and other salad oils, Lard; Cornstarch, Tapioca, Sugar.[11]

Nephrosis.—The third member of the renal Vascular Group, is different in character from the pure type nephritis. True nephrosis is confined to the tubules of the kidney and manifests itself by certain changes in the blood, lowered basal rate of metabolism, edema, and in many instances, anemia, due probably to the loss of protein from the blood (presence of appreciable quantities of albumin in the urine).

In many cases of nephrosis, it will be found that the nephritic symptoms are the most marked, hence, the treatment of the patient will necessarily have to be adjusted in a way not to increase the nitrogen retention or cause further damage to the renal organs. The diet in such cases is one more like those already outlined for the treatment of nephritis and hypertension. The fat intake must be

[11] The above menus, included through the courtesy of the California Dietetic Association, were formulated by Dr. Sansum and Miss Ruth Bowden, Potter Metabolic Clinic, Santa Barbara Cottage Hospital.

adjusted when nephrosis is one of the symptoms of nephritis, and the intake of protein raised gradually as long as no symptoms of nitrogen retention appear.

The dietary management of true or chronic nephrosis is a different matter, calling for definite restrictions, and definite increases in certain food materials. The disease yields to treatment as a rule, but the dietary management must necessarily be continued for a period extending from a few weeks to six months or more.

Characteristics of True Nephrosis.—The outstanding symptoms of chronic nephrosis according to Dr. Epstein are:—(1) Increased fat in the blood (lipoids, cholesterol), (2) a loss of protein from the blood, (albumin in the urine), (3) a decrease in the basal rate of metabolism.

The treatment of the disturbance is necessarily dietetic in character, the disturbance in fat metabolism as manifested by the large lipoid content of the blood, the reduction in the protein content of the blood, and the lowered basal rate would all point toward the need for dietary adjustment. Dr. Epstein has arranged a treatment with these point in view:[12] That is, one calculated to replace the protein loss in the blood; will compel the tissues to utilize the accumulated fat in the blood; and will reëstablish normal metabolism.

Protein Intake.—The protein allowance per day is high in this treatment, ranging from one and a half to two grams of protein per kilogram of body weight per day (1½ to 2 gms. or even higher, 2½ to 3 gms. per kilo.). The character of the protein is most important, only those proteins having a very low fat content or absence of fat entirely are included in the beginning, the best examples of such protein foods are:—Whites of eggs, lean fish, washed casein,

[12] Dr. Albert A. Epstein, Mt. Sinai Hospital, New York, "Treatment for Nephrosis," pub. Med. Clinics of N. America, Vol. 4, p. 1067.

and oysters: these foods are used in varying amounts to fill the diet prescription.

Fats.—In the beginning, and until the fat content of the blood has been reduced to a point more nearly normal, fats are excluded (in arranging the diet it is sometimes necessary to allow a very small amount of fat in order to have the food eaten).

Carbohydrates.—The carbohydrates in this diet vary in quantity to cover the needs of the body and to satisfy the appetite. The calorie intake is kept low in order to force the body to make use of the accumulated fat in the blood, and to utilize the excess protein content of the diet.

Sodium Chloride.—The intake of salt is not restricted particularly, enough is allowed to make the diet palatable, without undue excess (in cases complicated by presence of edema the sodium chloride will have to be adjusted).

Water or Fluid Intake.—The intake of fluids is likewise variable, enough is allowed to prevent the patient suffering from thirst, but an excessive amount of liquid is not advisable.

In addition to the foods mentioned in Dr. Epstein's "Nephrosis Diet," pure gelatin may be used with good effect, from 15 to 20 grams a day may be added to the diet without discomfort to the patient. This food material is fat free and a pure protein in form, it lends itself well to the diet being used either in jellies (gelatin desserts, aspics, or vegetable salads), or dissolved in the regular way and added to soup, coffee or cereal.

Casec,[13] a pure milk protein (dried), is another reënforcing agent of which the author has made use in increasing the protein content of the diet in treatment of nephrosis. In a diet so difficult in most instances to administer (having so little fat, no eggs, except the white, and no meat except

[13] Casec is a dried milk powder, put up by the firm of Johnson & Mead.

those that are free from fat), every additional reinforcing agent of protein character is welcome.

The following "Diet List" and accompanying Menu, will serve to demonstrate the way in which the Nephrosis Dietary may be adjusted. The nurse is urged to use her imagination in filling these diet prescriptions, and to teach her patients the art of substituting foods of like character for those listed in the menu included here.

NEPHROSIS DIETS

Rx. Prot. 170 Grams, Coh. 210 Grams, Fat 26 Grams.
Total Calories, 1754

Granulated gelatin	15 gm.
Skimmed Milk or Acidoliphus milk	640 c.c.
Egg Whites	7 whites
Chicken	100 gm.
Fish (lean)	100 gm.
Cottage Cheese	56 gm.
American Cheese	15 gm.
Casec	80 gm.
3% Vegetables	230 gm.
5% Vegetables	100 gm.
20% Vegetables (potatoes and peas)	200 gm.
Bread, S. F.	70 gm.
Macaroni	75 gm.
10% Fruit	250 gm.
20% Fruit	15 gm.
Butter	15 gm.
Sugar	35 gm.

Menu from Above List

Breakfast:

1 medium orange.

Creamed egg white on toast.

Hot skimmed milk flavored with coffee reënforced with I T. Casec.

Mid Morning Lunch:

1 glass (180 c.c.) fat free acidoliphus or skimmed milk, reënforced with 2 egg whites and 1 T. Casec.

Luncheon:

Potato milk soup (1 potato, 6 oz. skimmed milk, 1 slice onion, the soup may be thickened with ½ tsp. India gum if desired) add 1 tsp. gelatin.

Broiled fish (cod, flounder, haddock), 2 pieces 3″ x 3″ x ½″, with 1 tsp. butter, 1 cupful spinach, garnished with 2 hard cooked egg whites.

Apricot Whip (4 halves dried apricots, 1 egg white, 1 T. sugar, 1 tsp. gelatin [14]).

1 slice S. F. Bread.

Mid Afternoon:

1 glass acidolphus milk, skimmed or buttermilk, reënforced with 1 T. Casec and 1 tsp. gelatin.

Dinner:

Breast of chicken, 2 slices.

Green peas, ½ cup.

String beans, ⅔ cup.

Butter, 1 tsp.

Cottage cheese salad, with Uneeda crackers; 4 T. 2 small green onions, 3 lettuce leaves, mineral oil, French dressing, 2 crackers.

Baked macaroni, cooked macaroni (20 gm. raw or 100 gm. cooked) with 15 gm. Am. cheese grated (¾ inch cube).

Fruit Gelatin:

½ canned peach, ½ canned pear, 1 slice pineapple, 2 T. lemon juice, 1 T. sugar, (water packed fruit such as

[14] Gelatin referred to in these diets is a pure granulated gelatin, soaked in cold water and dissolved either in the hot milk, soup, etc., or made in the usual way in gelatin desserts.

used in diabetic diets used here, other wise leave out extra T. of sugar).

The chief point in the arrangement of the nephrosis diet is to select foods low in fat, moderate in carbohydrates and high in protein.

Egg white, pure gelatin, lean fish, breast of chicken, skimmed milk, buttermilk or acidoliphus milk made of skimmed milk. Casec, a milk protein (dry) is a good reënforcing agent, from a protein standpoint, it has little taste, and furnishes an easily digested protein which leaves no more residue than any milk protein. Cottage cheese furnishes a form of protein easily handled by the majority of patients, and capable of being used in the diet in various ways.

Oysters may be included (as a lean fish), they may be stewed or broiled (never fried), or they may be eaten raw. This food does not contain a very high percentage of protein, but they will serve to vary the diet.

The skimmed milk may be made into junket, and frozen if desired.

The gelatin may be used in fruit jellies, or made into vegetable aspics. A fat free broth, from chicken, with chopped nuts, celery and egg white may serve as a carrier of gelatin, and furnish a dish in which the protein is appreciable, this dish may be made still higher in protein if some of the breast of chicken is ground up and added to the broth.

When the fat content of the blood has decreased sufficiently to allow of other kinds of meat, it is not so difficult to fill the protein part of the diet. It is believed advisable to omit the yolk of egg from the diet for an indefinite period unless ordered by the physician, the cholesterol content of egg yolk being appreciable.

Substitutes for the 3%, 5%, 10%, 20% Vegetables may be in found in tables (Chapter XX) elsewhere.

NEPHROSIS DIET MENU No. II.

℞ Prot. 130 grams, Coh. 169 grams, Fat, 17 grams, Salt, 2.543 grams Total calories, 1,357		*Wt. Gms.*	*Col. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Salt Gms.*	*Cal.*
Buttermilk, acidoliphus,	1 average glass	180	9	5	1	.288	65
Milk, skimmed . .	2 " glasses	360	18	12	2	.540	138
Casec[15]	3 T. . .	18		15			60
Chicken	3 slices 3″x3″x⅛″	93		24	2	.144	114
Oysters, washed . .	6 medium size	100	4	6		.050	40
Cottage cheese . .	4 T. . .	56	2	12	1	.560	64
Bread, white, S. F. .	3 slices 3″x3″⅜″	60	33	6		.045	156
Fish: Haddock or Sole	2 slices 1″x1″x1½″	66		12	1	.114	60
Mayonnaise, mineral oil, S. F. . . .	2 T. . .	30				0	0
Gelatin	2 Tsp. . .	4		4			16
Egg white	5 egg whites	160		20		.400	80
Peas, fresh . . .	¾ cup . .	75	7	3		.030	42
String beans, fresh .	⅔ cup . . .	100	7	2		.040	36
Potato, baked . .	1 medium 2″x4″ .	100	20	3		.060	92
Spinach, cooked . .	½ cup . .	100	3	2		.120	20
Tomatoes, canned . Or Raw	1 cup, 2 medium .	200	8	2		.120	40
Orange juice . . .	½ cup, scant	100	14			.010	56
Peaches, canned . .	2 large halves	100	10	1		.010	48
Grapes	24 grapes .	100	19	1	1	.010	89
Sugar	1 T. . .	15	15				60
Butter, S. F. . . .	1 sq. (2 tsp.)	10			9	.002	81
			169	130	17	2.543	1357

Breakfast:

Grapes

Broiled haddock or sole

Bread, 1 slice

Skim milk, reënforced with 2 egg whites and 1 T. casec.

Luncheon:

Oyster stew, 6 oysters, 180 gms. skim milk. 1 T. casec.

Baked potato

String beans

[15] Casec is used here instead of raising the chicken and fish content of the diet abnormally. However, this is a matter of taste, and additional protein may be obtained by use of either of these protein foods.

Tomato gelatin
Bread, 1 slice
Butter, ½ square
Peaches

Dinner:

Chicken, 3 slices
Cottage cheese salad
Peas
Canned tomatoes
Spinach, garnished with 2 egg whites
Bread, 1 slice
Butter, ½ square
Orange sponge
Buttermilk, reënforced with 1 egg white and 1 T. casec.

Various diet schemes have been devised for simplifying the home management of diets used in the treatment of renal vascular diseases. Such diets are always more or less difficult to have carried out over any extended period of time. Consequently it has been found advisable to formulate a plan by means of which the patient might be given some latitude of choice at the same time not to overstep the tolerance point for protein, salts and fluids. Such a scheme is included here (see page 427).

In many instances it has been found more convenient for the physician to order the diet for nephritic and hypertension cases directly from a given table. This table is arranged in groups according to the amount of protein contained in each portion of food mentioned. The sodium chloride is estimated also; by using such an arrangement it is possible to regulate the intake of protein and salt much more accurately than is otherwise possible.

Another advantage of such a table is that it may be placed in the hands of the patient and directions given for filling the diet prescription allowing the patient to make her

own selection of food materials. In this way the daily menu stands less chance of becoming monotonous than is the case when a less flexible scheme is used.

In the following arrangement,[16] the foods are grouped according to their protein content, the portions in the first containing 8 grams of protein; the second, 6 grams; the third, 3 grams; the fourth, 2 grams; the fifth, 1 gram and the sixth, no protein. The physician may use the scheme of ordering the diet by "points," or in terms of protein. In the first group each portion represents 2 points, the second group each portion counts 1½ points, the third group, ¾ point, the fourth ½ point, the fifth ¼ point, the sixth no points but must be used with care on account of the salt content of the foods listed.

Name ....
Date ....
Physician ....

Foods are arranged in six groups, according to the amount of protein contained in each portion.

Portions have been weighed and estimated in grams, then measured and amounts indicated in terms of common household measures, *i.e.* tablesoons, teaspoons, cups, inches.

Salt content of food based on NaCl. contained in raw material.

Fuel value of food equals 4 calories per gram for protein —9 calories per gram for fat—4 calories per gram for carbohydrate.

Select food for day from the various groups, taking care that your diet does not exceed:

Protein ....Grams............in 24 hours
Salt ....Grams............in 24 hours
Calories ....in 24 hours
Fluid ....Pints............in 24 hours

[16] Table has been arranged in booklet form for The Polyclinic (Dr. Otis Warr) by author.

TABLE I

Average Serving of Foods Grouped According to Their Protein and Sodium Chloride Content

GROUP No. I

Each Portion Contains 8 Grams Protein[17]

Materials	*Household Measures*	*Wt. Gms.*	*Prot. Gms.*	*Salt Gms.*	*Cal.*
Beef, Hamburg steak	1 cake, 1¼" diam.	34	8	0.057	47
Beefsteak, Porterhouse	1 piece 2¼"x2½"x1"	36	8	0.055	97
Beef, roast	1 slice 3"x2½"x¼"	29	8	0.057	47
Chicken	1 slice 3"x3"x⅛"	31	8	0.048	38
Duck	1 slice 3"x3"x⅛"	44	8	0.040	112
Goose	1⅔ slice 3"x3"x⅛"	50	8	0.060	194
Ham, boiled[18]	1⅗ slices 4½"x2½"x⅛"	40	8	1.6-2.0	104
Lamb chop	¾ chop 2"x2"x½"	36	8	0.057	125
Lamb roast	1 slice 3"x2½"x¼"	40	8	0.067	75
Shrimp, fresh	5 whole shrimp	31	8	0.050	32
Soy bean meal	2 T.	15	8	0.015	65
Turkey	1 slice 2"x2"x⅛"	24	8	0.040	41
Veal, roast	1 slice 3"x2½"x¼"	36	8	0.057	58

GROUP No. II

Each Portion Contains 6 Grams Protein[19]

Cheese, American	1-inch cube	20	6	0.164	87
Cheese, cottage	2 T.	28	6	0.280	32
Cheese, cream	⅜ cake	25	6	0.250	104
Custard, ½ rule served	1 egg, 2 T. sugar, ¾ c. milk	107	6	0.219	145
Eggs	1 whole	50	6	0.088	78
Egg omelet	1 egg, 2 tsp. butter, S. F.	60	6	0.090	159
Egg, scrambled	1 egg, 2 tsp. cream, 1 T. water	75	6	0.100	96
Fish					
Bass, black	1 slice 1"x1"x1½"	33	6	0.069	30
Cod	1 slice 1"x1"x1½"	33	6	0.066	24
Haddock, perch	1 slice 1"x1"x1½"	33	6	0.057	30
Halibut	1 slice 1"x1"x1½"	33	6	0.066	40
Mackerel	1 slice 1"x1"x1½"	40	6	0.076	35
Oysters, washed	6 medium size	100	6	0.050	40
Salmon, canned	2½ T. packed	27	6	0.058	53
Trout, or shad	1 slice 1"x1"x1½"	33	6	0.061	54

T.=Standard level tablespoonful; tsp.=Standard level teaspoonful; c=Standard level cupful; Av.=Average; "=inches; Diam.=Diameter; S.F.=Saltfree; A.P.=As purchased; E.P.=Edible portion; Prot.=Protein; Cal.=Calories.

Reference: H. C. Sherman, L. G. Graves, Joslin Lock, F. M. Allen, Coleman & Forscheimer, Leva, Atwater & Bryant, H. Clark, Standford University Hospital, California.

30 grams per ounce instead of the fractional 28.35 grams per ounce is used to simplify the calculation.

[17] Counting by points = 2 points.
[18] If ham is soaked over night salt content is materially reduced.
[19] Counting by points = 1½ points.

GROUP No. III.—Each Portion Contains 3 Grams Protein [20]

Materials	*Household Measures*	*Wt. Gms.*	*Prot. Gms.*	*Salt Gram*	*Cal.*
Almonds	14 nuts E. P.	15	3	0.009	105
Bacon, raw	3 slices	30	3	1.200	183
Biscuit, homemade, S.F.	1 large	37	3	0.002	107
Bread, graham	1 slice 3″x2½″x½″	30	3	0.230	85
Bread, white	1 slice 3½″x3″x½″	30	3	0.130	76
Buttermilk	½ c. scant	100	3	0.160	37
Corn, green	⅜ c. (1 medium ear)	100	3	0.020	92
Cornbread, S. F.	1 piece 3″x2″x¾″	34	3	0.001	72
Cracker, graham	4 crackers 3″	30	3	0.310	123
Cracker, Uneeda	5 Uneedas	27	3	0.046	123
Cream, 20% X	½ c.	100	3	0.132	194
Egg, white	1 egg white (small)	24	3	0.060	12
Egg, yolk	1 yolk	18	3	0.027	57
Farina, cooked	¾ c. (30 gms. raw)	150	3	0.038	104
Lentils, cooked	2½ T. (weight dry)	11	3	0.030	38
Lima beans, fresh	¼ c.	43	3	0.006	50
Macaroni, cooked	½ c. packed	100	3	0.024	72
Milk, dried	2 T.	11	3	0.080	54
Milk, skimmed	½ c. scant	100	3	0.150	38
Milk, whole	½ c. scant	100	3	0.175	68
Motzoth, round tea	1 cracker	20	3	0.001	68
Peanuts	9 nuts, E. P.	11	3	0.010	62
Peas, fresh	¾ c.	75	3	0.030	42
Pecans	12 nuts, E. P.	30	3	0.024	221
Potato, boiled, mashed	½ c.	100	3	0.060	92
Potato, sweet	½ c.	100	3	0.160	180
Potato, white, baked	1 medium, 2″x4″	100	3	0.060	92
Roll, French	1 roll	35	3	0.008	109
Shredded wheat biscuit	1 biscuit	30	3	0.034	104
Walnuts, English	3 nuts, E. P.	15	3	0.010	106

GROUP No. IV.—Each Portion Contains 2 Grams Protein [21]

Apricots, dried	¼ c. (8 small halves)	50	2	0.007	132
Artichoke	1 medium (A.P. 150 gms.)	50	2	0.018	32
Asparagus, canned	5 tips (½ c.)	100	2	0.060	20
Asparagus, fresh	10 stalks 5″ long	100	2	0.060	20
Beets	⅔ c. cut in cubes	100	2	0.100	48
Bread, white, S. F.	1 slice 3″x3″x⅜″	20	2	0.015	52
Cocoanut, fresh	1 slice 2″x2″x½″	34	2	0.071	197
Cream, 40% XX	½ c. scant	100	2	0.070	380
Gelatin, granulated	1 tsp.	2	2		8
Kohlrabi	⅔ c.	100	2	0.090	32
Oatmeal (rolled oats), cooked	⅔ c. (30 gms. raw)	135	2	0.033	118
Okra	½ c.	100	2	0.070	36
Onion, fresh, green or scallions	4 small	100	2	0.034	48
Parsnips	¾ c.	100	2	0.050	64
Rice, cooked	½ c. (30 gms. raw)	135	2	0.027	104
Spinach, cooked	½ c.	100	2	0.120	20
String beans, fresh	⅔ c.	100	2	0.040	36

[20] Counting by points = ¾ point. [21] Counting by points = ½ point.

GROUP No. V

EACH PORTION CONTAINS 1 GRAM PROTEIN[22]

Materials	*Household Measures*	*Wt. Gms.*	*Prot. Gms.*	*Salt Gram*	*Cal.*
Apricots, canned	6 halves	100	1	0.003	72
Apricots, fresh	3 medium, E. P.	100	1	0.003	56
Brussels Sprouts	⅔ c.	100	1	0.070	16
Cabbage, cooked	¾ c.	100	1	0.040	28
Cabbage, raw	⅔ c. (shredded)	50	1	0.020	16
Carrots	¾ c.	100	1	0.060	40
Cauliflower	½ c.	100	1	0.060	28
Celery, fresh	4 stalks	100	1	0.260	16
Celery, cooked	¾ c.	100	1	0.260	16
Cocoa, dry	2 tsp.	5	1	0.004	21
Cucumber	10 medium slices	100	1	0.050	16
Egg plant	½ c.	100	1	0.040	24
Endive	10 stalks	100	1	0.275	16
Figs, dried	1 medium	25	1	0.017	80
Grapes	24 grapes	100	1	0.010	89
Greens, dandelion	½ c., cooked	100	1	0.168	24
Lettuce	10 leaves (¼ small head)	100	1	0.120	16
Muskmelon	½ c. cut in cubes	100	1	0.030	40
Peaches, canned	2 large halves	100	1	0.010	48
Peaches, fresh	1 medium, 2″x2″ diam.	100	1	0.010	40
Peppers, green	2 medium	100	1	0.020	24
Pumpkin, raw	½ c. cut in cubes	100	1	0.060	24
Raisins, seeded	¼ c.	30	1	0.040	105
Sorrel (sour grass)	½ c.	100	1		8
Squash, summer, fresh	½ c.	100	1	0.010	16
Squash, winter, fresh	½ c.	100	1	0.010	40
Strawberries, fresh	¾ c.	100	1	0.010	32
Tomatoes, canned	½ c.	100	1	0.060	20
Tomatoes, fresh	1 medium	100	1	0.060	20
Turnips	½ c.	100	1	0.070	32

GROUP No. VI

EACH PORTION CONTAINS NO PROTEIN BUT SOME SALT

Apple, baked, plus 1 T. sugar	1 medium apple	120		0.008	124
Apple sauce, plus 1 T. sugar	½ c.	125		0.008	135
Banana	1 small (2/3 medium)	100		0.206	92
Butter, salted	1 square (2 tsp.)	10		1.0-3.0	81
Butter, S. F.	1 square (2 tsp.)	10		0.002 to 0.021	81
Corn starch	3 T.	30		0.009	108
Cranberries, fresh	⅔ c.	100		0.015	40
Cream, 40% XX	2 T.	30		0.021	112
Figs, fresh	1 large (2 small)	25		0.005	20
Grapefruit	½ small (4 large sections)	100		0.008	40
Grape juice	½ c.	100		0.003	100
Honey	1 T.	30		0.014	96

[22] Counting by points = ¼ point.

GROUP No. VI—*Continued*

Materials	*Household Measures*	*Wt. Gms.*	*Prot. Gms.*	*Salt Gram*	*Cal.*
Horseradish	1 tsp.	5		0.001	2
Lard	2 T.	30			270
Lemon juice	½ c. scant	100		0.005	40
Mayonnaise, salted	1 T.	15		0.064	135
Mayonnaise, S. F.	1 T.	15		0.002	135
Molasses	1 T.	25		0.131	68
Mustard, dry	1 tsp.	3		0.001	
Olive oil	2 T.	30			270
Orange juice	½ c. scant	100		0.010	56
Oranges	1 medium, E. P.	100		0.010	48
Paprika	½ tsp.	½		0.001	
Pears, canned	2 halves	100		0.020	72
Pears, fresh	1 medium, E. P.	100		0.020	56
Pineapple, fresh	1 slice ¾″ thick	100		0.080	40
Prunes, cooked	6 medium	100		0.019	88
Radishes	5 medium	30		0.024	8
Rhubarb	¾ c. cut in cubes	100		0.059	16
Sugar	1 T.	15			60
Vinegar	2 T.	30		0.015	
Watercress	10 pieces	25		0.025	8
Watermelon	1 piece 2½″x2″x1½″	100		0.010	28

SUMMARY

In summarizing the important features in the dietetic management of renal vascular disturbances it would seem that moderation was the keynote of the situation. The necessary restrictions in protein, fats, sodium chloride and fluids are governed by the type and extent of the disturbance, and the individual requirements of the patient for whom the diet is intended.

In Nephritis the following points are to be considered:

1. When nitrogen retention is excessive the protein intake should be limited to 10-20 or 30 grams per day.

2. To spare the body proteins (reduce nitrogen metabolism) to do this it is necessary to raise the carbohydrates in the diet.

3. To keep the diet fairly smooth in order to facilitate absorption.

4. To keep the diet low in foods having a high per-

centage of irritating end products as possible (much meat, soups made from meat stock, onions, garlic, celery).

5. To limit the salt in the diet and in cases where edema is present, use salt free diets.

6. In acute stages when edema is present to limit the fluid intake to 750 c.c. per day, otherwise the fluid intake may be governed by demands of thirst. 1500 or more c.c. per day.

In Nephrosis the chief object of the diet is:

To rebuild the protein content of the blood by giving protein in larger amounts than is customary either in health or in other therapeutic conditions.

2. To restrict the fat in the diet in order to compel the body to use that which has accumulated in the blood to carry on the work of the organism; fat intake restricted to 20 to 40 grams as a rule, and lower in the beginning.

3. To keep the carbohydrates in the diet within certain limits, usually from 150 to 300 gms. per day, in order that the total calories may be low, and likewise require the tissues to use the fats and rebuild their own tissue from the protein in the food.

4. To prevent an excessive intake of fluid.

5. To adjust the salt intake to meet the needs of the individual patient.

In Hypertension there are various theories as to the way in which the diet should be regulated, but all agree that it is a disturbance which should be treated dietetically.

The following points form a basis for the necessary dietary regulations:

1. The diet should never be excessive either in amount or energy value, moderation is the keynote both in food and fluid intake.

2. The protein and salt intake must be regulated (*a*) to meet the needs of the individual, (*b*) to obviate nitro-

gen retention, and edema, and to prevent a deficiency in either.

3. When tea or coffee is taken the quantity should be limited to one cup a day, preferably at breakfast. Neither beverage should be made strong.

4. The diet should be higher in basic (alkaline) foods than in acids (see Sansum and Nazum, Treatment of High Blood Pressure and Nephritis).

5. Condiments should be used sparingly if at all.

6. The fluid intake each day should be limited to 1500 c.c. or under in ordinary cases and in conditions of myocardial insufficiency this amount may have to be still further decreased.

7. Constipation is a common accompaniment in hypertension cases, the diet should be so constructed as to overcome this whenever it is possible, the simplest means is to use fresh vegetables and fruits (600 to 800 grams per day, according to the amount of fluid allowed; frequently it is better to use the 600 gram allowance in the beginning (after the period of strict restrictions), and increase to 800 later if constipation persists.

8. Sweets must be restricted (*a*) because they ferment easily causing an evolution of gas which must be avoided in all cases of hypertension, as any pressure from indigestion is detrimental to the heart; (*b*) because they have a tendency to increase the weight which is contraindicated where the blood pressure is increased.

And finally in all renal vascular conditions to adjust the diet to meet the requirements of the individual patient; to use definite diet sheets simply as guides to point the way to a satisfactory method of handling each individual case.

The same general diet used in nephritis can be used in hypertension. As a rule the protein restrictions need not be so marked, unless the individual case calls for it. The pro-

tein intake may be based on ⅔ to 1 gram of protein per kilogram of body weight, the amount being raised if no nitrogen retention occurs.

The salt intake should always be low, and at times the salt-free diets give better results than the salt low diets (this means no salt added either during the preparation or the service of food, and in some cases only foods selected in which the sodium chloride is distinctly low). In salt low diets, a small amount of salt is allowed in course of food preparation, and possibly a small amount served with each meal.

CHAPTER XIX

DISEASES OF THE HEART

The dietetic treatment in diseases of the heart has been the subject of much study, especially during the past few years.

The Diet. — In this pathological condition, as in many other diseases in which one or more of the functions of the body have become impaired, there can be no hard and fast rule covering the treatment or diet for all cases, but, as in nephritis, the condition of the individual, his symptoms, and the progress and extent of the disease must be taken into consideration in order to formulate a diet calculated to adequately nourish the body, while at the same time imposing the smallest amount of work with the least expenditure of labor upon the part of the diseased organ.

Division of Treatment. — The treatment of the disease then may be said to be divided into three stages: first, the stage of compensation; second, that of moderate compensation; third, that of decompensation. The diet is directed, first, toward relieving as far as possible the strain which is imposed more or less by all the food eaten; and second, keeping up the general nutrition of the body.

Dietetic Treatment. — No matter what has caused the impairment of the heart functions, the treatment must necessarily remain the same as far as diet is concerned. The patient is no longer able to handle a full and unrestricted diet. As long as compensation is good, the restrictions are scarcely noticeable; alcoholic beverages and possibly tobacco may have to be, to a certain extent, curtailed, and in some cases avoided altogether. However, if the in-

dividual desires to live and be comfortable while so doing, he must lead a wholesome, simple life, since he cannot with safety indulge in any excesses, either in diet or in any other particular.

Diet in Second Stage.—When the second stage sets in, that is, when the heart muscle is unable to perform its normal function, attention must be directed toward two main points; first, the work of the heart; second, the pressure upon that organ from other sources, namely, the stomach and intestines. As long as the food does not disagree, that is, so long as there is no fermentation or putrefaction of the food material in the stomach and intestines the flatulence arising from the evolution of gas in those organs is slight and the pressure upward upon the heart inconsiderable.

Restricting the Fluids.—The heart must be spared all unnecessary work. This can only be accomplished by limiting the amount of food and fluids ingested. The latter imposes an extra burden upon the impaired organ to eliminate. Consequently, the amount of fluid should be limited to 1500 c.c. a day at most, and in many cases considerably less than that quantity.

Regulating the Meals.—The meals should be small and the intervals of feeding regular. It has been found best to give the fluids between meals rather than with the food. In many cases of heart disease, as in certain nephritic conditions, edema is a prominent symptom, so that it is necessary to direct our efforts toward overcoming that particular condition. The Karell Diet [1] and the salt-poor diet are used with excellent results. The latter is not so low as the former, and in many cases will accomplish all that is required. A modified Karell diet is used in the Michael Reese Hospital [2] in Chicago as follows:

[1] See Karell Diet, p. 402-403.
[2] "Food for the Sick," p. 150, by Strouse and Perry.

"MODIFIED KARELL TREATMENT"

(Salt free)

"Milk 200 c.c. at 8 A.M., 12 M., 4 P.M., and 8 P.M., for five to seven days.

Eighth day — Milk same as above.

10 A.M. one soft egg; 6 P.M. 2 slices of dry toast.

Ninth day — Milk as above.

10 A.M. one soft egg and 2 slices of toast.

Tenth to twelfth day — Milk as above.

12 M. chopped meat, rice boiled in milk, easily digested vegetables.

6 P.M. one soft-boiled egg.

The diet is gradually increased until a full tray is reached. All meats and vegetables should be chopped or scraped at first, and the heavier foods should be given only when the heart is practically compensated."

Rules and Regulations. — There are a few general rules which it has been found advisable to impress upon individuals suffering from a disease in which the muscles of the heart have become weakened. The compensation of the organ may improve, but there is still a danger of a re-occurrence or a further development more or less serious, and at times fatal. So for this reason, certain rules must be observed throughout life:

First: the necessity for keeping the meals small, simple, and digestible. Death at times occurs with symptoms of gastric disturbance, which is, after all, due to the heart. Consequently it is not wise to invite such disaster by overeating, or by the partaking of any food which is liable to bring about indigestion, either in the stomach or in the intestines. Most authorities advise four or five meals a day rather than the regulation three, and limit the fluids at meal time to a few ounces only, when any are allowed, and

to a maximum amount of 1500 c.c. during the day, chiefly between meals.

Second: the need for limiting the amount and type of exercise taken, especially after eating, since the work of digestion requires all the power and strain of which the heart is capable, and since an additional tax placed upon it by muscular exertion might readily be just the final straw, the added fraction which weighs down the balance on the scale of life.

Third: the advisability of abstaining from alcoholic beverages, unless specially prescribed by the physician in charge.

Certain elderly people suffer from a condition known as senile heart, which is more or less associated with arteriosclerosis and high blood pressure. These individuals should be prevailed upon to take the precaution of regulating their habits of life, avoiding excesses of all kinds, not only on account of the weakened condition of the heart, but also on account of the condition of the arteries. They should avoid excitement and worry, since the very fact that they are worrying increases the blood pressure. Simple foods in limited quantities, five meals a day instead of three, and an avoidance of too much fluid, should be the keynote of their daily régime.

Tact on the part of the nurse is necessary in all cases, both young and old. It is often more difficult to instill good dietary habits in heart patients, after acute symptoms have subsided, than to carry them out during the acute attack, when the life itself depends upon a rigid adherence to the diet prescribed. But as these rules and regulations are essential to the future welfare of the patient, he must be taught with care, and in such a way that he will not be alarmed to an extent when more harm than good will come of the teaching.

The diet should consist chiefly of milk, eggs, rare meat in

moderation (mutton, chicken, fish, and oysters), well-baked bread, well-cooked cereals, potatoes and green vegetables, and simple desserts. All foods which in any way cause gastric or intestinal disturbances must be avoided. If these disturbances arise during the course of the disease, the patient should be promptly returned to the strict milk diet. When edema is prominent, it is treated as already described in the treatment for the like condition in nephritis by the Karell or salt-free diet.

The dietetic treatment given here is merely a guide to be used under certain conditions. The physician formulates the diet, and the nurse must understand what to expect and how to apply the treatment as the symptoms arise.

SUMMARY

Dietetic Treatment, adjusted to relieve the weakened heart muscles and to save the organ from all possible strain.

Three Stages, during which the treatment changes according to the extent and progress made by the disease.

First Stage: The diet is practically normal. Compensation is good, consequently no dietary measures save the limiting of alcoholic beverages are necessary.

Second Stage: The compensation is only moderate and the heart cannot perform its normal functions, hence the diet must be directed toward relieving any pressure upon the organs from other organs and toward lessening the work of the heart itself.

Third Stage: In which the compensation is decidedly impaired and for this reason the dietetic treatment undergoes a decided change.

Digestional Disturbances in which there is an evolution of gas in the stomach or intestines may cause a pressure against the heart which is distinctly bad for it.

Limiting the Fluids in the diet in heart disease is necessary when the compensation is only moderate, as they impose an extra burden upon the organ to eliminate them.

Amount of Food must also be limited. The meals must be small and taken without fluid. The latter should be taken between meals.

Edema occurs in a number of cases and must be treated as in nephritic conditions by limiting the fluids and by confining the diet to "salt-poor" foods.[3]

Karell Cure or modification thereof has been used with good results in many cases of heart disease.

Exercise must be limited in amount and confined to types, which will not impose a tax upon the weakened heart muscles. Exercise after eating is especially to be discouraged, as this, together with the efforts required for the digestion of food, might readily prove too much for the heart to accomplish.

Elderly Patients must be warned against exercises of all kinds, not only on account of the condition of the heart, but also on account of the condition of the arterial walls. These harden with age and break down under undue pressure.

The Nurse should instruct the patient on the points necessary for the saving of the heart. She should teach the necessity for keeping the meals small and having them more frequently if necessary; of limiting the fluids at meals to a few ounces or leaving them out altogether at this time. She should know how necessary is the reduction of the fluid. She should also warn against the taking of alcoholic beverages except with the permission and advice of a physician.

Excitement and Worry increase the blood pressure hence must be avoided by individuals suffering with any form of heart disease.

PROBLEMS

(*a*) Write a diet order for an elderly patient with severe cardiac disturbance.

(*b*) Outline the method of administering the Karell diet.

[3] See Table I, p. 431.

CHAPTER XX

DIABETES

Definition.—Diabetes is a disease of the pancreas, in which certain island cells in the interior of the organ have been injured or exhausted to a point where they find it difficult to function normally.

The Organ Affected.—The pancreas performs two distinct functions in the body (1) preparing and delivering to the small intestines a secretion containing several important enzymes, or ferments, which assist in the digestion of foodstuffs; (2) preparing and delivering to the blood a substance directly concerned in the burning of glucose. The first secretion, pancreatic juice, is prepared by cells in the outer tissue of the pancreas, and is entirely separate from the substance secreted by the island cells in the interior of the organ; these cells are known as the "Islands of Langerhans," and the substance they secrete is called "insulin." Any injury to the island cells must necessarily affect their output of insulin, and thereby interfere with the normal oxidation of the carbohydrates in the body.

Symptoms of Diabetes.—Diabetes derived its name from one of its chief symptoms, excessive flow of urine, the name diabetes coming from the Greek word meaning fountain. Other important symptoms of the disease are: an increase in the glucose content of the blood, and the presence of sugar in the urine.

Normal blood contains about .1 of 1 per cent. glucose. This constant small percentage of glucose is always found in normal blood, but in diabetes the glucose accumulates to a certain point (varying with different individuals) until

it begins to spill over into the urine. It is not that the body manufactures more glucose than it does under normal conditions, but that it cannot use all of the glucose that it has made.

The Discovery of Insulin.—To Drs. Banting and Best of the University of Toronto, Canada, we are indebted for the discovery of insulin, and the means of making a similar substance available for use in the treatment of diabetes. These scientists discovered a method for extracting insulin from the internal secretion of the pancreas of slaughter-house animals. This substance is used by the body in the same manner that the body insulin is used.

Medical insulin is now manufactured both in this country and abroad, and a uniform system of labeling has been adopted by all firms making it, thus simplifying the purchase of insulin, and making it comparatively easy to regulate the dosage for practically all who have to use insulin daily.

Insulin is sold in vials containing 5 or 10 c.c. each. Each c.c. contains a given number of insulin units, for example:

Blue label, U-10, each c.c. contains 10 units of insulin; yellow label, U-20, each c.c. contains 20 units of insulin; red label, U-40, each c.c. contains 40 units of insulin.

Research has proved that each unit of insulin is capable of making available for use 2 grams of glucose in the body, hence in the giving of insulin to diabetic individuals it is necessary to know how the body is using the glucose, how much is being used as fuel, etc., and how much is being wasted. This requires a careful adjustment of the food intake, in addition to both urine and blood analyses.

Predisposing Factors in the Development of Diabetes.—Excessive over-eating, especially when the habit has extended over a period of years, may lead to the development of diabetes in certain individuals. In certain cases it is believed to result from the continual strain placed upon

the liver and pancreas to handle the excessive intake of food; in others it may result from the development of obesity, which frequently leads to diabetes. Infectious fevers, such as scarlet fever and flu, are considered accountable for many of the serious cases of diabetes in children. And when the disease occurs in several members of one family, heredity is believed to be an important factor in its development.

Other conditions which complicate the diabetic condition, and make treatment of the disease more difficult are: Skin infections, boils, carbuncles, etc., gangrene, toxic goiter, infections in the throat and nasal passages, typhoid fever, surgical operations (especially when tissues are badly bruised or the bones broken), extensive burns.

Any one of the above disturbances may exert a depressing effect on the tolerance, and possibly cause a mild diabetes to develop into a severe condition.

Insulin has proved a great boon in such cases, even in patients not requiring it under ordinary circumstances, since it takes the burden from the impaired pancreas and lessens the danger of acidosis, which frequently develops when such precautions are not observed. (The insulin dosage under such conditions will be discussed later.)

Effect of Food in Diabetes.—In order to obtain satisfactory results from a diet in this disturbance, it is essential not only to limit the intake of the carbohydrates in the diet, but also to limit the intake of any food material which may be reduced to glucose by the organism. For this reason, it seems wise to reduce the protein foods to the quantity which will simply maintain the nitrogen equilibrium, at least for a period when the disease is most severe. The fate of the fats in this condition presents another problem of the greatest importance to the diabetic patient. With an impairment of carbohydrate metabolism, there is likely to be a corresponding impairment in that of

the fats. With the splitting of this foodstuff to fatty acids and glycerol in digestion, the glycerol is readily utilized as glucose, but the fatty acids must pass through a series of changes before they are finally reduced to carbon dioxide and water. It is the non-completion of this orderly reduction which constitutes the danger point; *i.e.* instead of leaving the body as carbon dioxide and water, they stop short at the point where aceto-acetic acid is made, which results in the formation of aceto-acetic or diacetic acid, β-oxy-butyric acid, and acetone (known as ketone bodies). The concentration of such substances in the blood, and their presence in the urine, is indicative of a condition known as *acidosis,* which must be combated and overcome, otherwise it will inevitably lead to the most dreaded of all diabetic complications—diabetic coma.

Treatment of Diabetes.—There are five important points to be considered in the treatment of diabetes: (1) the prevention or relief of acidosis, which leads to the most dreaded complication known in diabetes, diabetic coma; (2) maintaining the patient in good nutrition; (3) reducing the glucose content of the blood to a point more nearly normal; (4) in freeing the urine from sugar and keeping it free; (5) and, finally in rebuilding the patient's tolerance to the handling of glucose.

Diabetic Acidosis and Coma.—When severe diabetes is allowed to go uncontrolled there is likely to develop a condition of acidosis which may lead to diabetic coma and death. This acidosis is caused by the formation of acetone or ketone bodies, diacetic acid, β-oxy-butyric acid, and acetone, in the body. Under normal conditions these substances do not form in abnormal amounts nor do they appear in normal urine. But, when the supply of glucose is oxidized, it is insufficient to assure the complete oxidation of the fatty acids derived from the fats, they are formed in dangerous amounts and may be detected in the urine by

certain tests (diacetic acid test and acetone tests). When the urine and blood show a high percentage of unused glucose it is always wise to test the urine for acids.

Causes for Diabetic Coma.—Acidosis or acid poisoning may occur when an excessive amount of food has been eaten. It may also occur as a result of infection, or surgical operations. When the diseased pancreas is forced to take care of an excessive amount of food it fails to secrete the amount of insulin necessary to burn the sugar on hand, consequently there is not enough to complete the burning of the fatty acids and the toxic end products thus formed accumulate and cause the most dangerous complication known in diabetes, diabetic coma.

Diabetic Coma (*Acidosis*).—The onset of coma in diabetes, is manifested by certain symptoms which it is the business of the nurse to recognize. Her first duty in such cases is to notify the physician.

Symptoms of Impending Coma.—Drowsiness; nausea; dizziness; pain in the stomach, back and legs; slow, deep, labored breathing; roaring in the ears; and a sweet fruity odor to the breath (acetone).

Treatment of Acidosis and Coma.—If, upon the entrance into the hospital, the patient shows evidence of acidosis and impending coma, he should be put to bed at once and kept warm with hot blankets and hot water bottles; he should be given an abundance of fluids to drink (if already in coma, or vomiting, the fluids may be given by enema); the physician should be notified at once, and an initial dose of insulin given. The amount of insulin to be administered cannot be stated as a hard and fast rule—the physician determines this; as a rule, however, about 30 units are injected at once and 5 oz. (150 grams) of orange juice are given by mouth, followed by another 150 grams of orange juice three hours later.

Every specimen of urine voided must be examined, and

the quantity of sugar excreted made the basis for determining the size of the dose of insulin to be used. The above treatment is repeated at intervals of six hours until the urine is entirely free from diacetic acid.

Preliminary Care, as administered by the nurse, and before the physician arrives, usually consists in (1) keeping the patient warm with blankets and hot water bottles (do not allow the patient to leave the bed for any purpose). (2) Giving a warm cleansing enema, (3) administering fluids, at least one quart every six hours; for children the amount of fluid may be reduced to one pint every six hours. For the adult it is advisable to give black coffee. A cupful every three hours is particularly useful under the circumstances. If the patient is vomiting and cannot retain the desired amount of fluid when given by mouth, the same quantity may be administered in form of normal saline solution, by rectum.

The Use of Insulin.—The discovery of insulin has made it possible to maintain diabetic individuals in a state approximating normal nutrition. It is not considered desirable to keep such patients undernourished; on the contrary it is much easier to avoid infections and build up the strength of an individual when their maintenance requirements are being covered, than it is when they are kept in a state of undernutrition. With the diet adjusted and the insulin given in amounts sufficient to take care of the glucose that would remain unoxidized without insulin, this factor is assured.

A unit of insulin will burn from 1.5 to 2 grams of glucose, consequently each unit injected add to the patient's tolerance just that much. The diets recommended are used with this knowledge in mind. The amount of insulin injected each day depends upon the extent of the diabetes. Few patients require more than 50 units each day, except when an emergency arises such as an attack of fever, etc., in which case not only more insulin will be required for

each injection, but also the number of injections each day will have to be increased (4 or more instead of 2 to 3 injections daily). In the high carbohydrate diets recommended by Dr. Sansum, the insulin dosage is much higher than that used by other clinicians.

Injecting the Insulin.—It is advisable to have two syringes on hand, in case of accident. Becton-Dickenson Company manufacture a syringe especially for Dr. Wilder of the Mayo Clinic. This is a 1 c.c. syringe graduated to ¼ c.c. When filled to the 1 c.c. mark it contains the number of units indicated by the label on the insulin bottle with blue label U-10, 10 units of insulin, etc. Secure 2 or more hypodermic needles to fit the syringe (no. 24-gage). Put one syringe and needle away to be used in case the one in daily use is broken, place the one in daily use together with two needles in a small clean jar filled with 95 per cent alcohol (it is advisable to have a layer of gauze or cotton on the bottom of the jar to protect the syringe and needles). Keeping the needles and syringe in alcohol eliminates the need for sterilizing each time. After finishing the injection, the syringe should be rinsed with alcohol and returned to the jar where it will be ready for the next injection. The same technique is used in giving the insulin injection as in giving any other hypodermic, that is, the skin is cleansed with alcohol. The top of the insulin bottle is wiped off with alcohol and the needle is pushed through the clean rubber cap, forcing the air in the syringe into the insulin bottle, then fill the syringe with the desired amount of insulin. Care should be taken to expell air bubbles should they appear in the syringe. The needle is pushed well under the skin, but not deep in the tissue, make sure that the needle is not in the skin before forcing in the insulin; when all of the insulin has been injected, remove the needle, hold the cotton wet with alcohol over the puncture for a few seconds. Insulin may be injected in any part of the body where the skin is

loose, but care should be taken not to use one place over and over, otherwise the tissues may break down.

Determining the Insulin Dose.—The amount of insulin to be given to a patient must be determined by the native tolerance and the diet (glucose content). It is better to calculate the diet to cover the patient's maintenance requirements, then adjust the insulin dosage; than to adjust the insulin and change the diet frequently. Some change will have to be made in the diet from time to time, but if the adjustments are carefully made in the first instance, and the sugar value of the diet is kept constant, usually 120 grams is recommended, the insulin dosage can be readily figured. It is seldom necessary to use more than fifty units each day, except in emergencies or when complications exist. In moderately severe cases from 10 to 30 units a day may be required, in mild cases even less. The insulin dosage should not be in excess of the needs. Just enough should be given to keep the urine sugar free, otherwise an insulin reaction is likely to occur.

When to Give Insulin (timing the injections).—When large doses of insulin are necessary (more than 30 units of insulin a day), it is best to divide the number of units in three, giving one third of the total before each meal; or as some physicians prefer, dividing the total into four parts, giving a dose before each meal and the last between ten and eleven P.M., the latter dose is given without the addition of food, when this method is used the nurse will be obliged to watch the patient carefully to prevent insulin reaction.

When not more than 10 units of insulin are required in twenty four hours, the entire dose may be taken at once, before breakfast, or 5 before breakfast and 5 before the evening meal. If 15 units or more are required in twenty four hours it is best to divide the dose into two equal parts and inject one before breakfast and the other before supper.

Testing the Urine When Insulin is Taken.—It is necessary to test the urine once or twice daily when insulin is taken. If sugar is found in the evening specimen a slight increase in the insulin dosage may be made (from 3 to 5 units are added the following day), if the sugar persists in the urine even after the extra units have been added, another addition may be made.

Insulin Reaction.—Not only the nurse must be taught to recognize the reaction from insulin, but the patient must likewise receive definite instruction on this subject; for insulin, like many another valuable tool, is dangerous when used without proper care and attention. There are certain fundamental rules that should be carefully learned and understood by nurse and patient alike, *e.g.* insulin must always be balanced with food. If the intake of food is not sufficient, or if more insulin is injected than can be used by the body to work the sugar brought in in food and derived from the tissues, the normal sugar in the blood will begin to disappear. When the glucose content of the blood drops below a certain level (0.10%) certain symptoms, alarming in character, will occur. This condition is known as *hypoglycemia.*

The symptoms of hypoglycemia from the insulin reaction) usually appear in from 1 to 2 hours after the insulin injection, and are (1) hunger (this symptom is not essentially present), (2) drowsiness, (3) muscular weakness, a sudden sense of fatigue, (4) a feeling of restlessness and nervous anxiety, (5) a sensation of trembling, this is not always visible muscular trembling, it is quite frequently merely a sensation, (6) a bounding, increased pulse rate, (7) quick breathing, (8) sweating. These are the early symptoms of too little sugar in the blood and may be made to disappear quickly if corrective measures are at once instituted. But, if the overdose of insulin has been large and the glucose on hand has not been sufficient to cushion the shock; or if

the symptoms are not recognized and combated at once, the patient may lose consciousness and die.

Treatment.—It is fortunate that so serious a condition may be quickly and effectively overcome by the giving of carbohydrate in some form. Sugar is the simplest and most easily obtainable antidote. It should be given by mouth if possible, in the form of orange juice (the juice of one small orange), syrup, honey, candy, or malted milk, any one of which will bring almost immediate relief. It may be necessary to repeat the dose later, but it is better not to give any more carbohydrate than is necessary to overcome the insulin reaction and bring the blood sugar back to its normal level. If the patient has lost consciousness and is not able to swallow the orange juice, or sugar, a solution containing 4 tablespoons of sugar (dissolved in warm water) should be given by rectum.

When the diet is properly balanced, severe reactions from insulin need not occur. Mild reactions are not unusual and may be controlled with orange juice; but if these reactions continue to occur for several days in succession, it is indicative of a need for dietary adjustment, *e.g.* from 5 to 10 grams of carbohydrates in some form added to the breakfast allowance, or a reduction in the amount of insulin. The advantage derived from giving the insulin in the morning is clearly demonstrated, in as much as any reaction from an overdose, or from an insufficiency in the food intake, must come at a time when the patient is awake and can take the necessary measures to protect himself; however, the small night dose of insulin is valuable provided the patient is adequately instructed regarding its use. It is likewise advisable to impress the patient with the importance of: (1) If at any time he cannot get insulin to reduce the diet one-third; to take less exercise and more rest in bed. (2) If a meal is missed to either omit the usual injection of insulin or cut it down materially.

Giving Insulin to Children.—The diabetic child has always been one of the most difficult of medical problems; at present he presents one of the most difficult of the insulin problems.

Children have a peculiar susceptibility to acidosis. They have necessarily a low volume of blood, and when insulin is injected the drop in the glucose content of the blood is precipitate; consequently the diet and the insulin dosage is more problematical with children than with adults. However, it is believed that the danger from over dosage may be fairly well controlled if the morning urine is allowed to contain a slight amount of sugar. Frequent blood analysis to show the sugar threshold is highly important in the treatment of diabetic children. The changes occur so suddenly that without this check upon the glucose level in the blood, hypoglycemia might develop.

In regulating the diets for children, it is always very essential that the vitamin content of their diet be carefully looked after. It is also essential that diabetic children should be safeguarded against contagious diseases as far as possible. Many cases of diabetes have developed as a result of influenza, and the treatment of such cases must be regulated by the physician and is essentially like that used in other complications (see Complication in Diabetes).

Dosage.—The number of units of insulin which it is best to give children varies, as it does with adults. The practice at present is to follow the same general routine for children over ten years of age as is used for adults. For younger children the adult dose is cut in half, *e.g.*, 20 units per day in very severe cases, and from 8 to 10 units daily in cases of milder character.[1]

Complications and Their Treatment.—As long as there is glucose in the urine that cannot be controlled by diet

[1] "Medical Clinics of North America," July, 1923, "Use of Insulin," by Dr. C. T. Barborak, Mayo Clinic.

(with the allowance sufficient to cover the maintenance requirements of the individual), insulin must be given. And when complication occur such as fevers, toxic goiter, infections, etc., which increase the strain on the organism materially it is more than ever essential to give insulin. In fact, the discovery of insulin has made it possible to save the lives of patients developing infections, or having to undergo serious surgical operation that in the past were lost.

The diet in such emergencies will have to be altered somewhat, the total calories will have to be reduced and frequently a liquid diet will have to be substituted for the general diet to which he has become accustomed. The emergency diets on pages 464-465 are recommended under such circumstances, the soft diet for less serious conditions, the straight liquid diet for those of a more serious character. Each of the diets have a sugar value of 100 grams, this amount of glucose is considered necessary to cover the energy requirements and to assist in the oxidation of the fats. If vomiting occurs, the glucose may be administered by rectum (Murphy Drip Method), 100 grams of pure glucose to 2000 c.c. (2 quarts) of water, 1 pint every 6 hours. Glucose may also be given subcutaneously or intravenously, in administering it subcutaneously the patient is given a 3 per cent solution made from distilled water, every 4 to 6 hours. When the glucose is given intravenously a 10 per cent solution made with triply distilled water is necessary, the glucose must be absolutely pure, only that of known purity should be used. The daily insulin dosage, as already stated, differs at such times from that used under ordinary diabetic conditions, it may be as high as 80 units (or higher) a day, but as a rule larger doses than this is not necessary. The injections should be made 4 times each day, usually 20 units, at 7 A.M., 12 M., 5 P.M. and 10 P.M. under the circumstances the patient should be watched with great

care. The urine should be tested every time it is voided, and in case of retention it should be drawn by catheter. The amount of sugar in the urine is used as a guide to the insulin dosage, the method used for gaging the dosage in one well-known hospital is: If the morning urine contains sugar and diacetic acid, give 20 units; if the specimen at noon shows only a trace of sugar, 5 units, or at most 10 units; if the 6 o'clock specimen is again loaded with sugar and diacetic acid another 20 units are injected.

Factors for Determining the Food Requirements.—The four important factors influencing the food requirements of diabetic individuals are: Age, sex, weight and height. These factors must always be considered in order to obtain an accurate picture of the food need of the individual patient. The requirements of children over twelve years of age are based upon the same four factors.

The Weight Factor.—It is considered better to base the estimates for basal energy requirements of adults upon the ideal weight rather than the actual weight at the time of examination. Height and weight tables for men and women may be found on pages 594-595 of the appendix, these tables while not altogether ideal, at least give an approximate idea of the desired weight of the individual for a given thought. If such tables are not at hand the following method may be used to determine the desired weight for a known height:

(1) Height of the individual may be taken in inches.

(2) Multiply the number of inches by 2½ and subtract 100 the result gives the desired weight in kilograms.

(3) Thus, a man 6 feet in height, which is equivalent to 72 inches (6 x 12 inches=72 inches) should weigh, 72 x 2½=180, 180—100=80 kilograms, or the desired weight for a man 6 feet in height.

Basal Energy Requirements.—The basal maintenance requirements refers to the amount of food required to cover

the patient's needs at bed rest; the basal energy requirements refers to the total number of calories required to maintain the patient at bed rest.

Maintenance Requirements.—Maintenance requirements include the number of calories allowed for basal maintenance, plus the additional number necessary to cover the increased physical activity incidental to normal living. The degree of activity, the character of work performed, and as to whether the work is carried on indoors or in the open air, determines the extent of the increase in calories to be made over the basal allowance. For example, a man living a sedentary life, whose work kept him indoors (in an office), would probably not require more than a thirty per cent increase over his bed-rest requirements; whereas, if he were a laborer at hard muscular work, possibly a farmer, or a man handling freight, his maintenance allowance might readily call for an increase of fifty or even sixty per cent or more, calories to cover his requirements.

If the maintenance diet causes a gain in weight above that which is desired for the individual, it would be advisable to reduce the fat intake for a few days and watch the results. If this does not accomplish the desired result it may be necessary to rearrange the dietary several times in order to hold the body weight at the desired point. If there is a loss of weight upon the estimated maintenance diet the total calorie intake may have to be increased and the surplus covered with insulin if glucose appears in the urine.

The Protein Intake.—It is desirable to restrict the protein to simply cover the protein (nitrogen) needs of the individual, first because 58 per cent of all the protein metabolized is converted into glucose, second because protein has the power to stimulate the metabolic processes which is not desirable in diabetes. Extensive experiments in the protein intake of diabetic individuals have proved that an allowance of 2/3 gram per kilogram of body weight is suffi-

cient to cover the nitrogen needs of the body, slight increases in this allowance is frequently made. Dr. Wilder of St. Mary's Hospital, Rochester, Minn., allows 50 grams of protein each day. This amount has been found sufficient for both large and small patients. It is rarely desirable to increase the protein higher than 1 gram per kilogram of body weight.

Carbohydrate Restriction.—The value of limiting the intake of carbohydrates in the diet for diabetic individuals, is too universally acknowledged to require discussion, the restrictions are made except in cases taking the so-called "High Carbohydrate Diet for Diabetes," formulated and recommended by Dr. Sansum of the Potter Metabolic Clinic, Santa Barbara, Calif. (see page 467). Glucose is known to exert a stimulating effect upon the cells that secrete insulin, hence when an excessive amount of glucose is passed through the overworked pancreas, it has the effect of still further reducing its power to burn the glucose on hand.

Carbohydrates cannot be excluded from the diet entirely, however, (1) becaue, in order to assure the oxidation of the fats, a proportionate amount of glucose must be oxidized also; (2) because it is difficult to make a diet palatable when the carbohydrates are reduced to a very low point; (3) because there is danger of reducing the vitamin intake and of lowering the normal alkali level when the foods that can be depended upon to furnish the vitamins and alkaline bases are too greatly restricted.

The Fat Allowance.—The fat allowance is essentially higher in the average diabetic diet than that of either the protein or carbohydrate, this is necessary in order to supply a sufficient number of calories to cover the maintenance requirement of the individual. The only other means would be to give the calories in form of carbohydrate and to cover the glucose with insulin. This would be obligatory if the

calories were not furnished by the fat in the diet. The intake of fat, however, has to be carefully adjusted since there is always more or less danger from acidosis when the supply of glucose oxidized in the body is limited.

Woodyatt in his paper on "Optimal Diets in Diabetes" called attention to the need for keeping the ratio of fatty acid to glucose (Fa/G.) at 1.5. Others advocate a Fa/G of 2.5.

The sugar value of the diet then, is of the greatest importance, since it is used as a means for determining the danger from the development of acidosis. A diet containing a sufficient amount of glucose from all sources to obviate a chance of acidosis is the one the physician endeavors to prescribe. It is well for the student to keep in mind that 58 per cent of all of the protein metabolized is converted into glucose, that all of the carbohydrates are convertible into glucose and that a small part of the fat (10 per cent) is likewise used by the body in the form of glucose, the sugar value of the diet represents the sum of these figures.

Calculating the Diabetic Diet (for adults and children over twelve years of age).—There are several methods used for calculating the diet prescription, the first and simplest of these is the method formulated and used in the Mayo Clinic.[2] The estimations are made by means of charts, carefully worked out to furnish a diet containing 50 grams of protein, and a sugar value of 120 grams. The energy requirements are based upon the four factors: age, sex, weight and height, rather than on weight alone.

Chart I.[3]—The ideal weight is spotted on Scale I and the individual's actual height on Scale II. A straight edge (ruler) joining these two points a point of the surface area scale, Scale III. The age and sex of the patient is then

[2] Courtesy of Dr. Russell M. Wilder, Mayo Clinic.
[3] Pub. Primer for Diabetic Patients, 3rd edition, Wilder.

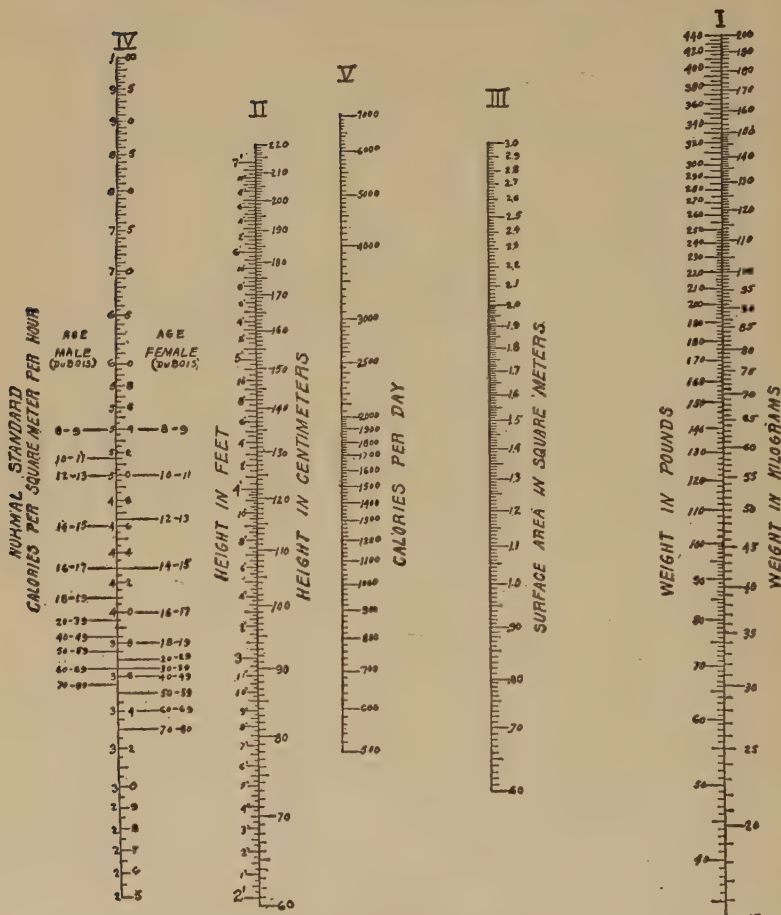
spotted on Scale IV and a straight edge from this point to the point previously located on Scale III crosses Scale V at the required total calories for "basal maintenance."

Chart II.—Next the total calories obtained previously from Chart I is spotted on Scale M of Chart II, and a straight edge is laid from here through the point P. Where the line thus crosses the Fat Scale F. and the Carbohydrate Scale C, can be read off fat grams and carbohydrate grams which with 50 grams of protein give the desired calories and a glucose equivalent of 120 grams.

Carbohydrate restriction is sufficient if the glucose does not exceed 120, and the amount of carbohydrate allowed in diets planned in this manner is ample to insure an adequate vitamin and mineral supply.

Example.—Suppose the patient is a bookkeeper, aged 40, six feet (72 inches) in height. Turn to Chart I and spot the point 180 on Scale I, spot the point 6 feet on Scale II, and connect these points with a straight edge. Locate the point of Scale III, at which the straight edge crosses that scale. Next find on Scale IV the point corresponding to the patient's age and sex. In this case it is 38 calories, with the straight edge connect this point with the one located on Scale III. The edge crosses Scale V, at the basal requirements, which is in this case 1860 calories. This should be increased by 30 per cent since the patient is a bookkeeper living a sedentary life, making the total food calories 2418. Now turn to Chart II and locate 2418 on the total food calorie scale, Scale M. Extend the straight edge across the chart in a line between this point and the point P. It crosses Scale C at the carbohydrate figure 69 and the Scale F at a figure 220, the glucose equivalent of 69 grams of carbohydrate, 50 grams of protein and 220 grams of fat is 120 $(69+(0.58 \times 50)+(0.1 \times 220)=120)$. Basal requirements =Coh. 76 gms., prot. 50 gms., fat 150 gms.

DIABETIC DIET CHART [4]



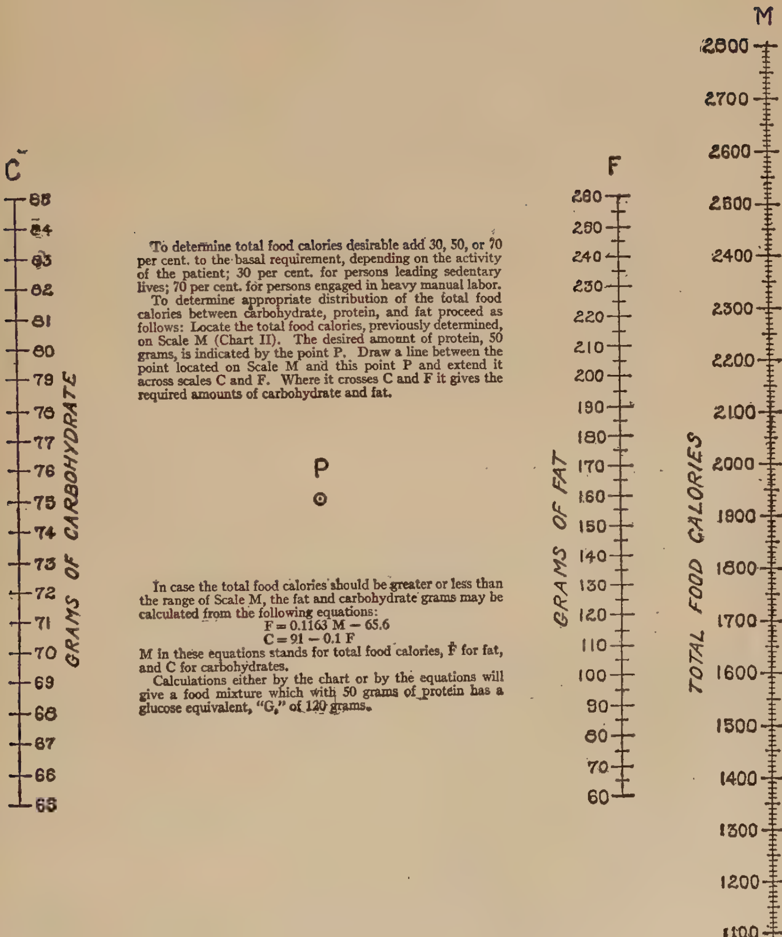
DIRECTIONS

When calculating do not draw lines on the charts, but merely indicate their positions by a ruler with a true straight edge. Locate the various points by means of needles (pin stuck through the eraser of a lead pencil).

To determine basal calorie requirement proceed as follows: Locate the patient's "ideal" weight on Scale I (Chart I) and his height on Scale II. A straight line joining these two points intersects Scale III at the patient's surface area. Locate the point on Scale IV corresponding to the patient's age and sex. A straight line joining this point to the point previously found on Scale III crosses Scale V at the basal calorie requirement.

[4] Courtesy Dr. Wilder, and W. B. Saunders Co.

DIABETIC DIET CHART[4]



To determine total food calories desirable add 30, 50, or 70 per cent. to the basal requirement, depending on the activity of the patient; 30 per cent. for persons leading sedentary lives; 70 per cent. for persons engaged in heavy manual labor.

To determine appropriate distribution of the total food calories between carbohydrate, protein, and fat proceed as follows: Locate the total food calories, previously determined, on Scale M (Chart II). The desired amount of protein, 50 grams, is indicated by the point P. Draw a line between the point located on Scale M and this point P and extend it across scales C and F. Where it crosses C and F it gives the required amounts of carbohydrate and fat.

In case the total food calories should be greater or less than the range of Scale M, the fat and carbohydrate grams may be calculated from the following equations:

$$F = 0.1163\ M - 65.6$$
$$C = 91 - 0.1\ F$$

M in these equations stands for total food calories, F for fat, and C for carbohydrates.

Calculations either by the chart or by the equations will give a food mixture which with 50 grams of protein has a glucose equivalent, "G," of 120 grams.

BASAL REQUIREMENTS BASED OF WEIGHT

(1) Ideal weight (use table page 594, or method suggested for determining ideal weight on page 453).

(2) Weight in pounds divided by 2.2 to change pounds to kilograms (if table is used).

(3) Weight in kilograms multiplied by 25 (or 20 if individual is obese), to obtain the total calories for day.

(4) Weight in kilograms multiplied by ⅔ to obtain the number of grams of protein for the day.

(5) As a rule the carbohydrate allowance is suggested by the physician and the fat allowance arranged to make the ratio of fat to glucose about 2.5 : 1 (2½ grams of fat to every gram of glucose).

For example, suppose the ideal weight of patient is 80 kilograms, his basal energy requirements would be approximately 80 x 25, or 2000 calories for the day.

The protein allowance would be obtained by multiplying 80 by ⅔ (since ⅔ of a gram of protein is allowed for every kilogram of body weight), which in this case would give the patient a protein allowance of 53 grams for the day.

Now should the physician select 50 grams of carbohydrate as approximating the patient's needs, the calories furnished from 50 grams of protein and 50 grams of carbohydrate would amount to 100 x 4 (since every gram of protein and every gram of carbohydrate furnishes 4 calories of heat, the calories from 100 grams of the combined substances would amount to 400 calories.

2000 calories—400 calories would leave 1600 calories to be furnished from fat. Fat has a calorie value of 9 calories per gram, hence 1600÷9=177.7 or practically 178 grams of fat. The sugar value of this diet would be approximately 97 grams which would be sufficient to prevent acidosis since there is more than a gram of glucose to two grams of fat.

Basal diet for a man forty years old, 6 ft. in height, 180 lbs. in weight, doing sedentary work.

℞ Coh., 76 grams
Prot., 50 grams
Fat, 150 grams
Sugar, value 120 grams

FOOD FOR THE DAY

Protein

	Grams
Meat and oysters	150
Eggs	50
Milk	180

Carbohydrates

3% vegetables	200
5% vegetables	400
10% fruit	100
15% fruit	100
Bran muffins	
Cellu-bran wafers	

Fats

Bacon, crisp	21
Cream, 20%	240
Butter	30
Mayonnaise	45

Breakfast

Food materials	*Approx. Meas.*	*Weight Grams*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Orange juice	½ cup, scant	100	14	..	..	56
Bacon crisp	3 slices	21	..	3	9	93
Egg	1, average size	50	..	7	5	73
Bran muffin	1	..	..	1	5	49
Butter	1 square	10	..	..	9	81
Cream, 20%	5 T., 1 tsp.	80	3.6	2	14.6	154
Coffee						

Luncheon

Food materials	*Approx. Meas.*	*Weight Grams*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Oysters	6 large.........	100	4	6	..	40
Milk, whole ...	1 average glass..	180	9	6	7	123
Cabbage	¾ cup..........	100	6	1	..	28
Salad						
Lettuce	5 leaves........	50	1.5	0.5	..	8
Tomato	1 medium	100	4	1	..	20
Mayonnaise ..	1⅓ T..........	20	..	..	20	180
Bran muffin	1	...	..	1	5	49
Cellu-bran wafers						
Butter	1 square........	10	..	..	9	81
Cream, 20%....	5 T., 1 tsp.....	80	3.6	2	14.6	154

Dinner

Food materials	*Approx. Meas.*	*Weight Grams*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Roast beef, lean	2 slices 4½"x2½" x⅛"	50	..	14	3	83
Greens (turnip or mustard).....	½ cup..........	100	5	1	..	24
String beans....	½ cup..........	100	5	1	..	24
Salad						
Lettuce	5 leaves........	50	1.5	0.5	..	8
Pepper or pimento....	1 large.........	100	5	1	..	24
Mayonnaise ..	1⅔ T.	25	..	..	25	225
Cellu-bran wafers						
Butter	1 square........	10	..	..	9	81
Grapefruit	½ small.........	100	10	..	..	40
Cream 20%	5 T., 1 tsp......	80	3.6	2	14.6	154
Coffee						
			76	50	150	1856

This diet may be raised to a maintenance diet of 69 gms. coh., 50 gms. prot. and 215 gms. fat by the addition of:

Food materials	*Approx. Meas.*	*Weight Grams*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Cheese, American	1 piece 1" square	20	..	6	7	87
Cream 40%	6 T.	90	3	..	36	336
Butter	2½ squares......	25	..	..	22	198
Kohlrabi	½ cup..........	100	5	2	..	28
			8	8	65	649

And subtraction of:

Food materials	Approx. Meas.	Weight Grams	Coh. Gms.	Prot. Gms.	Fat Gms.	Cal.
Oysters.........	6 large.........	100	4	6	..	40
Cabbage	¾ cup..........	100	6	1	..	28
Peppers	1 large.........	100	5	1	..	24
			—	—		—
			15	8		92

Basal diet plus 50% for maintenance for a woman of forty years old, 5 ft. 3 in. in height, 135 lbs. in weight, doing active work.

FOOD FOR THE DAY

Protein	*Grams*
Meat and fish	95
Eggs	50
Milk	180
Carbohydrates	
3% vegetables	200
5% vegetables	200
10% vegetables	100
15% fruit	200
Bran muffins.	
Cellu-bran wafers.	
Fats	
Avocado pear	120
Bacon	21
Cream 40%	90
Butter	30
Mayonnaise	45

Breakfast

Food materials	Approx. Meas.	Weight Grams	Coh. Gms.	Prot. Gms.	Fat Gms.	Cal.
Orange juice ...	½ cup, scant....	100	14	..	..	56
Bacon, crisp....	3 slices.........	21	..	3	9	93
Egg............	1 average size ..	50	..	7	5	73
Bran muffin	1	..	..	1	5	49
Butter..........	1 square........	10	..	..	9	81
Cream, 40%....	2 T.	30	1	..	12	112
Coffee.						

Luncheon

Food materials	*Approx. Meas.*	*Weight Grams*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Salmon, canned.	½ cup..........	50	..	11	6	98
Spinach	½ cup..........	100	3	2	..	20
Carrots.........	¾ cup..........	100	9	1	..	40
Lettuce	10 leaves.......	100	3	1	..	16
Mayonnaise	2 T.	30	..	..	30	270
Bran muffin	1	..	..	1	5	49
Butter.........	1 square........	10	..	..	9	81
Cream, 40%....	2 T.............	30	1	..	12	112
Apple	1 small.........	100	14	..	..	56

Dinner

Food materials	*Approx. Meas.*	*Weight Grams*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Lamb chop.....	1 med. 2″x2″x½″	45	..	10	13	157
String beans....	½ cup	100	5	1	..	24
Tomatoes, canned	½ cup	100	4	1	..	20
Avocado pear...	½ med. A. P...	120	9	4	15	187
French dressing.	1 T.	15	...	..	15	135
Bran muffin	1	..	..	1	5	49
Cellu-bran wafers						
Butter	1 square........	10	..	..	9	81
Cream	2 T.	30	1	..	12	112
Milk, whole....	1 average glass..	180	9	6	7	123
			73	50	178	2094

EMERGECY DIETS

I.—Emergency Diet—*Sugar value, 100 gms.*

		Weight Grams	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
8 A.M.	Hot skimmed milk......	150	8	5	..	52
10 A.M.	Orange juice............	100	14			
	Sugar	5	5	..	..	76
12 NOON	Hot skimmed milk......	100	5	3	..	32
2 P.M.	Orange juice (100 c.c.) sugar 5 gm...........	105	19	..	..	76
4 P.M.	Orange juice (100 c.c.) sugar, 5 gm...........	105	19	..	..	76
6 P.M.	Orange juice (100 c.c.) sugar 5 gm...........	105	19	..	..	76
8 P.M.	Hot skimmed milk	100	5	3	..	32
			94	11		420

II.—Emergency Diet—*Sugar value, 100 gms.*

		Weight Grams	Coh. Gms.	Prot. Gms.	Fat Gms.	Cal.
8 A.M.	Skimmed milk	200	10	7	1	77
10 A.M.	Skimmed milk	200	10	7	1	77
12 NOON	Skimmed milk	200	10	7	1	77
2 P.M.	Skimmed milk	200	10	7	1	77
4 P.M.	Skimmed milk	200	10	7	1	77
6 P.M.	Skimmed milk	200	10	7	1	77
8 P.M.	Skimmed milk	200	10	7	1	77
			70	49	7	539

III.—Light Diet—*Sugar value, 100 gms.*

Breakfast

		Weight Grams	Coh. Gms.	Prot. Gms.	Fat Gms.	Cal.
Orange juice ...	½ cup	100	14	..	..	56
Toast	½ slice, 3″x 3″x ⅜″	10	5.5	1	..	26
Butter	1 sq. (2 tsp.)...	10	..	..	9	81
Egg, soft cooked	1 average size..	50	..	7	5	73
Cream of Wheat	1 T/dry (¼ c. cooked)	10	8	1	..	36
Cream, 20% ...	3 T.	45	1.5	1.5	7.5	80
10 A.M. Milk, whole	¾ aver. glass ..	150	8	5	6	106

Dinner

	Approx. Meas.	Weight Grams	Coh. Gms.	Prot. Gms.	Fat Gms.	Cal.
Cream soup, 5% vegetable purée (spinach or asparagus)	⅓ cup	66	2	1	..	12
Milk, whole	½ cup, scant ...	100	5	3	4	68
Cream, 20%	2 T.	30	1	1	5	53
Toast	½ slice 3″x 3″x ⅜″	10	5.5	1	..	26
Butter	1 sq. (2 tsp.)...	10	..	..	9	81
Raspberry DZerta	1 serving	..	..	..	..	..
3 P.M. Milk, whole	¾ aver. glass ..	150	8	5	6	106

Supper

Food materials	*Approx. Meas.*	*Weight Grams*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Creamy egg, 1 egg	1 average size...	50	..	7	5	73
Cream 20%	2 T.	30	1	1	5	53
Toast	½ slice 3"x 3"x ⅜"	10	5.5	1	..	26
Butter	1 sq. (2 tsp.)...	10	..	..	9	81
Grapefruit	¼ small (2 large sections) ..	50	5	..	..	20
8 P.M.						
Orangeade, orange juice ..	1⅔ T.	25	2.5	..	..	6
Lemon juice ...	1⅔ T.	25	2.5	..	..	14
Totals			75.0	35.5	70.5	1077

Estimating the Diets for Children (under thirteen years of age).—With children under thirteen years of age it is best to base the estimations of basal energy requirements on the height and sex without regard to age and weight. The basal requirements of the child should be amplified by the addition of extra calories for activity, which depending on the liveliness of the child, will equal from 40 to 70 per cent of the basal requirement.

The proportionately greater protein requirement of children is provided for the diets planned in Chart II, since 50 grams for a child weighing less than 110 pounds is in excess of a gram per kilogram of weight, and the smaller the child, the greater the excess, as is desirable. It is very important to include milk in the diet of children, and the day's allowance should be planned to contain a pint of milk and cream. In all other respects the planning of these diets is like that of adults.

Other schemes have been suggested to simplify the estimation of diet for diabetic children—one of the most comprehensive being that arranged by Dr. J. D. Boyd and Martha V. Nelson, State University of Iowa. Pub. in Jour. Am. Dietetic Assn., 1926.

THE HIGH CARBOHYDRATE DIET IN THE TREATMENT OF DIABETES MELLITUS [5]

A Chapter on Diabetes and the advances that have been made in the treatment of that disease during the past few years would be incomplete without the inclusion of the "High Carbohydrate Treatment for Diabetes" arranged and recommended by Drs. W. D. Sansum, N. R. Blatherwick and Miss Ruth Bowden, of the Potter Metablic Clinic, Santa Barbara, California.

The Routine treatment of diabetes with the high carbohydrate diets does not differ in any way from the usually unaccepted methods except that more insulin is required. All will agree that each patient should be freed from, and kept free from, the acetone type of acidiosis; that he should be fully nourished; that he should be kept sugar-free, and that the blood sugar should be maintained at a normal level.

With our present diet plan, in addition to adequate protein, we are using 2 or more grams of carbohydrate to each gram of fat. As a routine we divide the total amount of food into equal amounts for each of the three meals of the day. Two doses of insulin are used, five-eighths of the total dose being given thirty minutes before breakfast, and three-eights at the same interval before supper, with minor variations as necessary. When the insulin dosage is small, one dose may be given daily with two large meals following the insulin, and no insulin before the smallest meal.

We keep the patient sugar free to our subnormal urine test; that is instead of using eight drops of urine to 5 c.c. of Benedict's solution we use 16 drops of urine. When unusually small or unusually large amounts of urine are

[5] Courtesy of Drs. Sansum and Blatherwick and Miss Ruth Bowder, Potter Metabolic Clinic, Santa Barbara Cottage Hospital, Santa Barbara, California.

passed, we use proportionately fewer or more drops for the test.

Table I represents the routine diet formulas in use at the present time. These are varied somewhat to suit the individual needs of each patient. If he gains weight too fast we eliminate part of the fat only, thus increasing the ratio of carbohydrate to fat.

Diet I is our acidosis diet and consists of 90 grams of oatmeal (dry weight), 300 c.c. of skim milk and 1000 c.c. of fruit juice. The oatmeal and skim milk are divided into three meals, and the fruit juice given both with and between meals. In general, orange juice seems to be the most suitable, and often, especially if there is a tendency toward nausea and vomiting lemon juice or grapefruit juice is mixed with the orange juice. When the patient is free from acidosis, the remaining diets are used in order listed, up to the maintenance level. Ample insulin is given, but no attempt is made to render the patient sugar free on the acidosis diet. The patient is desugarized on Diet 2. He is kept comparatively quiet while on the low diet, lest he burn his body fat and thus precipitate acidosis. If the case is not too severe, and especially if there is no acidosis we often start with the diet at supposed maintenance level, using either no insulin or a small dosage and gradually raising it to the required level. We thus eliminate the irksome days of partial starvation and inactivity.

Table II presents a typical diet as served. Potatoes are generally used as the 20 per cent vegetable. Attention is especially directed to the large servings of fruit. For convenience in estimating the caloric value of foods the lower percentage vegetables and fruits are placed in 3, 6, 9, and 10 per cent groups. This system is simple, since the average rather than the precise value of foods is used, and yet seems to be sufficiently accurate for all clinical purposes.

TABLE I.—*Routine Diet Formulas*

No.	Diet	Carbohydrate	Protein	Fat	Calories
1	Acidosis	257	28	12	1,248
2	1,000 calories	95	48	49	1,013
3	1,500 calories	146	69	71	1,499
4	2,000 calories	202	79	97	1,997
5	2,200 calories	217	93	107	2,203
6	2,500 calories	245	100	124	2,496
7	3,000 calories	301	116	150	3,018

Standard Diet of 2,200 Calories *

Type of Food	Breakfast	Dinner	Supper	Grams
3 per cent. vegetable	...	200	250	450
6 per cent. vegetable	...	...	100	100
20 per cent. vegetable	...	125	...	125
Eggs	2	...	...	...
Bacon	15	...	...	15
Lean meat (15 per cent. fat)	...	75	60	135
Butter	10	15	15	40
Bread	45	30	30	105
20 per cent. cream	25	50	25	100
10 per cent. fruit	275	225	300	800
Dry cereal	20	...	200	20
Whole milk	100	...	200	300

* Carbohydrate, 216; protein, 89; fat, 108; calories, 2,192.

THE PATIENT'S TOLERANCE

Most diabetic patients provide some insulin, though generally not enough to burn an adequate diet. The amount of food which he can burn is known as his tolerance. Each patient has his own tolerance and the treatment of each case becomes therefore an individual problem. Moreover, the tolerance of each individual is not a fixed quantity; it usually improves under correct management and decreases under unusual stress.

To calculate a patient's tolerance, it must be remembered that each unit of insulin burns about two grams of the food of his diet. If, for instance, the diet contains 216 grams of carbohydrate, 90 grams of protein and 108 grams of fat, the

total grams of food are 414. And if on this diet the patient is taking 40 units of insulin, this insulin is burning about 40 times 2, or 80 grams of the food. The patient's tolerance is then 414 minus 80 or 334 grams of food. To determine a tolerance, multiply the insulin dosage by 2, and subtract this amount from the total grams of food of the diet.

This is the patient's tolerance at this particular time. It may change, and every change in tolerance must be met with a corresponding change in the insulin dosage. A long period of absence of sugar in the urine will usually cause an improved tolerance and a consequent overdosage of insulin. The dosage will then have to be decreased. On the other hand, an infection, such as a cold, will injure the tolerance and the patient will begin to pass sugar in the urine. The dosage should then be increased. The tolerance, in short, is a very sensitive and variable factor. Its improvement is the reward for careful treatment, resulting in a betterment of the general condition of the patient and a decreased cost of the insulin used.

TWENTY-FOUR HOUR NORMAL AND SUBNORMAL URINE TEST

24-hour amount	*Normal Test*	*Subnormal Test*
500 c.c.	1 drop	2 drops
750 c.c.	1 drop	2 drops
1000 c.c.	2 drops	4 drops
1250 c.c.	2 drops	4 drops
1500 c.c.	3 drops	6 drops
1750 c.c.	3 drops	7 drops
2000 c.c.	4 drops	8 drops
2250 c.c.	4 drops	9 drops
2500 c.c.	5 drops	10 drops
2750 c.c.	5 drops	11 drops
3000 c.c.	6 drops	12 drops
3250 c.c.	6 drops	13 drops
3500 c.c.	7 drops	14 drops
3750 c.c.	7 drops	15 drops
4000 c.c.	8 drops	16 drops

Thus far, we have found no definite relation between insulin and the various types of food, but in the measuring of food tolerances and the adjustment of the insulin dosages to new diets, we have had excellent results by assuming that 1 unit of insulin will burn on the average of 2 grams of food. If a patient has no tolerance and is placed on a diet containing 200 gm. of carbohydrate, 100 gm. of protein and 100 gm. of fat, or 400 gm. of food, he will need 200 units of insulin daily. We have had a number of extremely severe diabetic patients to whom we have given doses nearly as high as this.

From the patients' standpoint, the most striking advantage gained by the use of these high carbohydrate diets has been the improvement in physical and mental activity. Such an improvement can be evidenced only by testimonials which are admittedly unreliable, but a few experiments with these diets will rapidly convince one of the truth of the observation. In the milder cases, such improvement was noted within a few weeks following the change in diet. In other patients who had been on the old diets for many years, the change occurred more gradually over a period as long as from three to four months. Two of our laboratory workers volunteered to eat a typical diabetic diet, balanced according to the Woodyatt formula, fat equals 2 carbohydrate plus ½ protein, and within a few days they began to complain of a diminution in their mental and physical powers. This was associated with acetone in the urine and considerable indigestion, doubtless due to the large amounts of fat. Following this experiment, it required some time to restore them to normal.

THE CALCULATION OF THE TOTAL AMOUNTS OF EACH TYPE OF FOOD

After the total caloric value of the diet is known, it is necessary to determine the total grams of each type of food.

To do this, we first estimate the number of grams of protein needed for the patient. By multiplying this number by 4, we find the number of calories which are to be made up from the protein. This number is subtracted from the total number of calories and we have the number of calories to be provided by the carbohydrates and fats together. Since the ratio of carbohydrate to fat is to be two-to-one, each gram of fat containing its 9 calories will be accompanied by two grams of carbohydrate containing 8 calories. In other words, for every 17 calories, there will be one gram of fat and two grams of carbohydrate. We therefore divide the total number of calories to be made up of the fat and carbohydrate together by 17 and thus arrive at the number of grams of fat in this diet. Twice this amount will be the number of grams of carbohydrate.

To illustrate, let us suppose that the number of calories of the diet are to be 2200. If the protein grams are to be, say, 90, then 90 times 4 are 360, which is the number of calories to be derived from the protein alone. By subtracting this 360 from the total of 2200, we find that there are left 1840 calories to be made up from the fat and carbohydrate together. By dividing 1840 by 17, we get 108, which is the number of grams of fat in this diet. Twice 108 are 216, which is the number of grams of carbohydrate. This diet will then consist of 216 grams of carbohydrate, 90 grams of protein and 108 grams of fat. The total caloric value is then 2196, only four less than the 2200 calories which we were seeking.

THE CALCULATION OF THE CALORIC VALUE OF A GIVEN DIET

If the amounts of the foods of a diet are known, it is a simple matter to calculate the total value of the diet. For instance, on the diet on page 469, there are 200 grams of 3 per cent vegetables for dinner and 250 grams for supper. This makes a total of 450 grams for the day and this amount

is written in the column of "Grams" as shown. By referring to the table of food values on page 478 [6] we find that 100 grams of 3 per cent vegetables contain 3 grams of carbohydrates, 1 gram of protein and no fat. The 450 grams, therefore, contain four and one-half times these amounts, or 14 grams of carbohydrate, 5 grams of protein and no fat. These figures may then be written in the extension columns like those in the diet on page 469. Then again on the line for Bread, there are 45 grams for breakfast, 30 grams for dinner and 30 grams for supper, making a total of 105 grams for the day. Reference to the table shows that 100 grams of bread contain 53 grams of carbohydrate, 9 grams of protein and 2 grams of fat. The 105 grams of bread will have 1.05 times these amounts, or 56 grams of carbohydrate, 9 grams of protein and 2 grams of fat. These totals are then written in the columns for that purpose. In this same manner the extensions are made for every line. Then each column is totaled, the carbohydrate column first, then the protein column and lastly the fat column. The diet used in the example now reads 216 grams of carbohydrate, 89 grams of protein and 108 grams of fat. To find the total food value of this diet, the grams of carbohydrate are multiplied by 4, the grams of protein by 4 and the grams of fat by 9, and these three products added together. This diet is found to contain 2192 calories.

In order to find the number of grams of food for each meal, these extensions will have to be made for each meal separately. In this diet, the meals are about of the same value in food grams.

THE PLANNING OF THE DIABETIC DIET

Our diabetic diets have been made as nearly normal as possible, using every food except sugar and products actually sweetened with sugar. The ratio of carbohydrate to fat of

[6] The estimates differ slightly since Dr. Sansum's Food Tablets are not included.

the United States army ration is four-to-one. Our diets have the ratio of two-to-one, which should be high enough to keep the patient free from the dangers of acidosis.

In planning the diet, five points should be considered:

1. The caloric requirements of the patient should be met.

2. The grams of carbohydrate should be twice the number of the grams of fat. Our diets usually contain from 200 to 300 grams of carbohydrate and from 100 to 150 grams of fat.

3. There should be sufficient bulk in the diet to keep the bowels moving regularly without the use of cathartics. Our diets contain from 800 to 900 grams of fruits and vegetables for each day.

4. There should be the proper balance between the acid-ash and the alkaline-ash foods. We shall discuss this principle and its necessity in the section on Basic Diets, beginning on page 416-417.

5. Each meal should contain about one-third of the total number of grams of food and should have the proper balance of the carbohydrates to fats.

A MENU

Breakfast

Sliced Orange (275 grams)
Poached Eggs (2) Bacon (15 grams)
Oatmeal (20 grams dry weight) Milk (100 grams)
Toast (45 grams) Butter (10 grams)
Coffee with Cream (25 grams)

Dinner

Roast Lamb (75 grams)
Fresh Asparagus (100 grams) Riced Potatoes (125 grams)
Tomato Salad (100 grams) Salad Dressing
Bread (30 grams) Butter (15 grams)
Strawberries (225 grams) with Cream (50 grams)
Tea

Supper

Cold Chicken (60 grams)
Spinach (100 grams) Egg Plant (100 grams)
Combination Salad (150 grams of lettuce, cucumbers, tomatoes and celery)
Salad Dressing
Sliced Peaches (300 grams) with Cream (25 grams)
Bread (30 grams) Butter (15 grams)
Milk (200 grams)

EQUIPMENT

A certain amount of equipment is essential to the filling of any diet prescription; *i.e.* scales, and, when it is possible, dishes in which the food may be both weighed, cooked and served. When the patient is at home, it may be that he can partake of vegetables and meat served at the common table, in which case his portions must be weighed separately. In the diet kitchen the standard gram scale is used. The diets are always figured in grams, and the method is much more accurate than that of measuring. In the home, especially when expense must be considered, a postal scale may be purchased at much less expense, and the table, page 478, showing the content of the different foodstuffs in grams will facilitate the planning of the menus.

Method of Filling the Diet Prescription.—There are certain points to be considered in filling the diet prescription of the diabetic, as well as in planning meals for the normal individual; *i.e.* the need for vitamins, mineral salts, and means for preventing or overcoming constipation. Fresh vegetables to form the bulk of the carbohydrate content of the dietary, with cream, butter and eggs, will prevent danger of either a deficiency in the vitamin or mineral content; the coarser vegetables, and a small amount of bran or agar will eliminate the danger from constipation. With children, the diet is necessarily slightly different, since they require their proteins largely in the form of milk,

which, as we know, contains appreciable amounts of carbohydrate; hence, in planning the diet for diabetic children due allowance must be made for the sugar in the milk, the same being deducted from the carbohydrate content of the dietary.

Factors Influencing Selection of Food.—The filling of the prescription consists of selecting, weighing, and preparing the food for each individual diabetic patient. The first point to consider is the selection of foods containing the proper amounts of cabohydrates, protein, and fat; after which it is more or less simple to follow the taste of the patient, substituting one food of like composition which is liked, for one for which the patient has manifested a distaste. This is an important part of the nurse's duty, since the diet must assume a place in the day of the diabetic second to none, and a meal that is composed of dishes relished by the patient is more likely to be eaten and digested than one which must be forced.

Diabetic Nursing.—The demands made upon a nurse caring for a diabetic patient, are greater than in most abnormal conditions. Not only is she called upon to administer the bedside care incidental to her calling, but she must understand how to make the urine tests, even if she is not called upon to make them in the hospital. She is expected to be in a position to select, weigh, and even prepare the diet for the patient that he may receive the proper amount of the various foodstuffs to meet his individual requirements. She must be able to recognize symptoms as they occur, and take measures to combat them, and finally she must be so familiar with the disease in its various phases that she can properly instruct the patient to carry out the physician's orders after dismissal.

When a patient is admitted to the hospital, the nurse sees that he is put to bed and kept warm. It may be that the history shows a large output of sugar, a great increase

in the sugar content of the blood, and a definite acidosis, and coma may be impending. These symptoms call for immediate attention on the part of the nurse. She must provide him with an abundance of fluids; water, fat-free broths, black coffee (as directed by the physician). After which the diet is adjusted to get rid of the surplus sugar in the urine and combat any sign of acidosis manifested by the patient.

Recognition of Acidosis and Coma.—There are a number of symptoms by which the condition of severe acidosis may be recognized, but it is not one symptom alone but a combination of symptoms that point the way to recognition of acidosis and impending coma. (See page 445.)

The following small table of food materials in one ounce portions is printed on cards and may be carried in the pocket to assist the diabetic in estimating the diet when away from home.

30 Grams 1 oz. Contain Approximately	*Carbohydrates* Grams	*Protein* Grams	*Fat* Grams	*Calories*
Vegetables 5%	1	0.5	0	6
Vegetables 10%	2	0.5	0	10
Shredded Wheat	23	3	0	104
Uneedas, two	10	1	1	53
Potato	6	1	0	28
Bread	18	3	0	84
Oatmeal, dry weight	20	5	2	118
Oysters, six	4	6	1	49
Milk	1.5	1	1	19
Meat (cooked, lean)	0	8	5	77
Fish	0	6	0	24
Chicken (cooked, lean)	0	8	3	59
Egg (one)	0	6	6	78
Cheese	0	8	11	131
Bacon	0	5	15	155
Cream, 20%	1	1	6	62
Cream, 40%	1	1	12	116
Butter	0	0	25	225
Oil	0	0	30	270

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TABLE II

Diabetic Diets

Standard Portions of Foods, with Composition and Total Calories

Food Materials	*Approximate Measure*	*Weight Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Vegetables 1-3%						
Asparagus, canned	8 small tips (½ cup)	100	3	2	..	20
Asparagus, fresh	10 stalks, 5″ long	100	3	2	..	20
Brussels sprouts	⅔ cup	100	3	1	..	16
Celery, fresh	4 medium stalks	100	3	1	..	16
Celery, stewed	¾ cup	100	3	1	..	16
Cucumber	10 medium slices	100	3	1	..	16
Endive	10 medium stalks	100	3	1	..	16
Lettuce	10 leaves (¼ small hd.)	100	3	1	..	16
Mushrooms	⅔ cup	100	3	1	..	16
Sorrel (sourgrass)	½ cup	100	3	1	..	16
Sour cucumber pickle	1 pickle, 4½″x1½″x1¼″	100	3	1	..	16
Spinach	½ cup	100	3	2	..	20
Squash, summer	½ cup	100	3	1	..	16
Swiss chard	¾ cup	100	3	1	..	16
Vegetables 3-6%						
Cabbage, cooked	¾ cup	100	6	1	..	28
Cabbage, raw	⅔ cup, shredded	50	3	1	..	16
Cauliflower	¾ cup	100	6	1	..	28
Egg plant	½ cup	100	4	1	..	20
Greens, dandelion	½ cup	100	5	1	..	24
Greens, mustard	½ cup	100	5	1	..	24
Greens, turnip	½ cup	100	5	1	..	24
Kohlrabi	½ cup	100	5	2	..	28
Peppers, green or pimento	1 large or 2 small	100	5	1	..	24
Pumpkin	½ cup	100	5	1	..	24
Radishes	5 medium	30	2	..	..	8
Rhubarb	¾ cup	100	4	..	..	16
Sauerkraut	¾ cup	100	4	1	..	20
String beans	½ cup	100	5	1	..	24
Tomatoes, canned	½ cup	100	4	1	..	20
Tomatoes, fresh	1 medium	100	4	1	..	20
Water cress	10 pieces	25	2	..	..	8

30 grams are considered to weigh 1 ounce in the above table. The fuel factors 4-9-4 for carbohydrates, fats and protein, respectively, are used for estimating the fuel or caloric value of foods given.

T = Standard level tablespoonful.	Coh. = Carbohydrates.
tsp. = Standard level teaspoonful.	Prot. = Protein.
A.P. = As purchased.	Cal. = Calories.
E.P. = Edible portion.	″ = Inches.

Recipes for diabetic breads given on pages 144-145.

Diabetic Diets—*Continued*

Food Materials	*Approximate Measure*	*Weight Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Vegetables 6-10% Cont.						
Carrots	¾ cup	100	9	1	..	40
Okra	½ cup	100	7	2	..	36
Oyster plant (salsify)	⅔ cup	100	7	1	..	32
Rutabagas	¾ cup	100	9	1	..	40
Squash, Hubbard	½ cup	100	9	1	..	40
Turnips	¾ cup	100	7	1	..	32
Vegetables 10-15%						
Artichoke	1 large	300	12	4	..	64
Beets	¾ cup	100	10	2	..	48
Green peas, fresh	¾ cup	100	10	4	..	56
Onions, fresh	4 small	100	10	2	..	48
Onions, scallions	3 very small	100	10	2	..	48
Parsnips	¾ cup	100	14	2	..	64
Vegetables 15-20%						
Beans, navy, cooked	⅓ cup	80	18	7	..	100
Corn, green	⅜ cup (1 medium ear)	100	20	3	..	92
Green peas, canned	½ cup, scant	100	17	7	..	96
Lima beans, fresh	¾ cup	100	22	7	..	116
Potato, baked	1 medium sized, 2″x 4″	100	20	3	..	92
Potato, boiled	½ cup	100	20	3	..	92
Potato, sweet	¼ cup	50	21	1	..	88
Vegetable Combinations						
Beet soup (borsch)	1 cup (1 serving)	240	5	6	5	89
Spinach soup	1 cup (1 serving)	240	4	6	5	85
Veg. soup without 15-20% vegetables	1 cup (1 serving)	240	4	5	4	72
Veg. soup, potato added	1 cup (1 serving)	240	17	7	4	132
Veg. soup, macaroni added, 7 gms.	1 cup (1 serving)	240	9	6	4	96
Veg. soup, rice, 10 gms. added	1 cup (1 serving)	240	12	6	4	108
Fruit 10-20%						
Apple	1 small	100	14	..	..	56
Apple sauce	½ cup, without sugar	150	21	..	..	84
Apricots, fresh	3 small	100	13	1	..	56
Apricots, dried	4 halves	25	15	1	..	64
Apricot whip, without sugar	1 egg white, 4 halves, dried	57	15	1	..	80

DIABETIC DIETS—*Continued*

Food Materials	*Approximate Measure*	*Weight Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Fruit 10-20%—*Continued*						
Banana	1 small (⅔ medium)	100	22	1	..	92
Blackberries	¾ cup, scant	100	10	1	..	44
Blueberries	⅔ cup	100	13	..	..	52
Cherries	12 medium E.P.	70	16	1	..	68
Cranberries	⅔ cup	100	10	1	..	44
Grapes, fresh	24 grapes	100	19	1	1	89
Grape fruit	½ small (4 large sections)	100	10	..	..	40
Lemon (E.P. 3 T. juice)	1 medium	74	4	..	..	16
Lemon juice	½ cup, scant	100	10	..	..	40
Muskmelon	½ cup, cut in cubes	100	9	1	..	40
Muskmelon	½ small, 4″ diameter	120	9	1	..	40
Orange, whole	1 medium	100	12	..	..	48
Orange juice	½ cup, scant	100	14	..	..	56
Peach, fresh	1 medium, 2″x 2″ diam.	100	9	1	..	40
Pears, fresh	1 medium	100	14	..	..	56
Pineapple, fresh or canned without sugar	1 slice, ¾″ thick	100	10	..	..	40
Plums, fresh	4 small (2 large)	100	20	1	..	84
Prunes, cooked	6 medium	100	22	..	..	88
Raspberries, red, fresh	¾ cup	100	13	1	..	56
Strawberries	¾ cup	100	7	1	..	32
Watermelon	1 piece, 2½″x 2″x 1½″ or ½ cup cut in cubes	100	7	..	..	28
Cereals and Breadstuffs						
Barley, pearled	3 T. (dry)	30	23	3	..	104
Biscuit, wheat, home-made	1 biscuit, 2″x ¾″	25	12	2	2	74
Bread, graham or whole-wheat	1 slice 3″x 3½″x ½″	30	16	3	..	76
Bread, white or rye	1 slice 3″x 3″x ⅜″	20	11	2	..	52
Bran cakes (Joslin)	8 cakes	..	..	6	8	96
Bran muffins, Olmstead	6 muffins	..	1	5	23	231
Bran muffin	1 muffin	..	..	1	5	49
Bran soya	1 muffin	..	1	1	3	20
Celu-bran wafers, malted	No food value.					
Cornbread, pone	1 pone, 2½″x 4″x 1″	34	6	3	4	72
Cornflakes	½ cup	15	12	1	..	52
Corn-meal mush, cooked	½ cup	100	14	2	..	64

DIABETIC DIETS—*Continued*

Food Materials	*Approximate Measure*	*Weight Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Cereals and Breadstuffs—Continued						
Corn-starch	3 T. (dry)	30	27	..	..	108
Crackers, saltine	1 saltine	..	2	..	..	8
Cream of Wheat, cooked	½ cup	100	16	2	..	72
Diaban muffin	1 muffin	..	5	5	3	67
Farina, cooked	½ cup	100	15	2	..	68
Gluten flakes	½ cup	40	..	18	..	72
Hominy, cooked	⅔ cup	100	20	2	..	88
Macaroni, boiled	½ cup, packed	100	15	3	..	72
Motzoth, round	1 cracker	..	14	3	..	68
Noodles, boiled	¾ cup	100	16	2	2	90
Nutrivoid flour bread	1 slice	..	..	2	1	17
Oatmeal, rolled oats, cooked	½ cup	100	14	3	1	77
Rice, dry	2 T.	20	16	2	..	72
Rice, boiled	½ cup	100	18	2	..	80
Soybean muffin	1 muffin	75	10	13	11	191
Shredded wheat biscuit	1 biscuit	30	23	3	..	104
Tapioca	3 T. (dry)	15	13	..	..	52
Uneeda biscuit	1 Uneeda	..	5	..	..	20
Dairy Products						
Butter	1 square, aver. serving	10	..	..	9	81
Butter	1 tsp.	5	..	..	4	36
Buttermilk	1 average glass	180	9	5	1	65
Cheese, American	1 piece, 1″ square	20	..	6	7	87
Cheese, American, grated	8 T. dry (4 T. fresh)	30	..	8	10	128
Cheese, cottage	4 T.	60	2	13	1	69
Cheese, cream, Neutchatel	½ roll	20	1	4	6	74
Cheese, cream, N. Y. or Phila.	⅜ cake	20	1	5	7	87
Cheese, Swiss	1 thin slice	15	..	4	5	61
Cream 20% (X)	½ pt. (1 cup)	240	11	6	44	464
Cream 20% (X)	2 T.	30	1	1	6	62
Cream 40% (XX)	2 T.	30	1	..	12	112
Cream, 40% (XX)	½ pt. (1 cup)	240	7	5	96	912
Cream, whipped	1 heaping T.	30	1	1	8	80
Milk, condensed, unsweetened	1 T.	15	2	1	1	21
Milk, dried, skimmed	5½ T.	30	15	11	trace	104
Milk, dried, whole	5½ T.	30	11	8	8	148

DIABETIC DIETS—*Continued*

Food Materials	*Approximate Measure*	*Weight Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Dairy Products—Continued						
Milk, skimmed ...	1 average glass	180	9	6	1	69
Milk, whole	1 average glass	180	9	6	7	123
Milk, whole	2 T. (1 oz.)	30	2	1	1	21
Eggs						
Egg omelet	1 egg, 2 tsp. butter, 1 T. water	70	..	7	14	154
Eggs, whole	1 average size	50	..	7	5	73
Egg, white	1 egg white	32	..	4	..	16
Egg yolk	1 egg yolk	18	..	3	5	57
Meat						
Beef						
Frankfurters	1 4½" long	31	..	6	6	78
Gelatin	1 tsp.	2	..	2	..	8
Roast, lean	2 slices 4½"x 2½"x ⅛".	50	..	14	3	83
Roast, med. fat...	2 slices 4½"x 2½"x ⅛".	50	..	13	7	115
Steak, hamburg ..	2 cakes (¼ cup packed)	60	..	14	3	83
Steak, porterhouse	1 piece 2½"x 2½"x 1"..	50	..	11	10	134
Steak, round, lean	1 piece 2½"x 2½"x 1"..	50	..	11	5	89
Steak, sirloin, med. fat	1 piece 2½"x 2½"x 1"..	50	..	10	9	121
Lamb						
Lamb chop	1 medium 2"x 2"x ½"..	45	..	10	13	157
Roast, lean	2 slices, 4½"x 2½"x ⅛".	50	..	10	6	94
Roast, med. fat...	2 slices, 4½"x 2½"x ⅛".	50	..	13	7	115
Pork						
Bacon, crisp	1 long thin slice........	7	..	1	3	31
Bacon, raw	1 long thin slice........	10	..	1	7	67
Ham, boiled	2 slices, 4½"x 2½"x ⅛".	50	..	10	10	130
Ham, med. fat....	1 slice, 4½"x 4"x ⅛"...	35	..	8	12	140
Sausage	1 cake 3"x ½".........	30	..	8	13	149
Side meat, salt pork	1 cube, 1" cooked......	15	..	1	8	76
Veal						
Roast, lean	2 slices, 4½"x 2½"x ⅛".	50	..	11	4	80
Roast, medium fat	2 slices, 4½"x 2½"x ⅛".	50	..	13	7	115
Poultry						
Chicken breast ...	1 slice, 4"x 4"x ⅛"	50	..	13	1	61
Chicken, leg	Leg with bone.........	60	..	12	5	93
Chicken	Second joint, with bone	70	..	16	6	118
Chicken, broiler, dressed with bone	½ small (E. P. 52 gms.)	94	..	11	3	71
Duck, breast	2 slices 1¾"x 1½"x ⅛".	50	..	9	10	126
Goose	1 slice, 3½"x 3½"x ⅛".	50	..	8	18	194
Quail	1 whole (E. P).	50	..	13	3	79
Squab	1 whole (E. P.).........	50	..	9	11	135

DIABETIC DIETS—*Continued*

Food Materials	*Approximate Measure*	*Weight Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Poultry—Continued						
Turkey breast	1 slice, 3½"x 3"x ⅛"...	50	..	17	2	86
Turkey, dark	2 slices, 1¾"x 1½"x ⅛".	50	..	20	2	98
Fish						
Bass	1 piece, 3"x 3"x ½"	50	..	9	1	45
Cat	1 piece, 3"x 3"x ½"	50	..	6	9	104
Caviar, Russian...	1 heaping tsp.	10	1	3	2	34
Cod, steaks.......	1 piece, 2"x 1½"x 1" ...	50	..	9	..	36
Crab, hard	1 crab, A. P.	245	1	19	2	98
Haddock	1 piece, 2"x 3"x ½"	50	..	9	1	45
Haddock, smoked or pickled.......	1 piece, 2"x 3"x ½"	50	..	12	..	48
Halibut	1 piece, 2½"x 1½"x ¾".	50	..	9	3	63
Herring, pickled ..	1 piece, 1¼"x 1¼"x 1"..	50	..	14	1	65
Herring, smoked ..	¼ small herring	50	..	18	8	142
Lobster	½ small	240	1	14	2	78
Mackerel	1 piece, 2"x 3"x ½"	50	..	10	4	76
Oysters	6 large oysters	100	4	6	..	40
Perch	1 piece, 3"x 3"x ½"	50	..	10	2	58
Salmon or shad...	1 piece, 3"x 3"x ½"	50	..	11	6	98
Salmon, canned...	½ cup	50	..	11	6	98
Sardines	6 small (3 large)	50	..	12	10	138
Scallops	½ cup, raw A. P.	90	..	13	..	104
Shrimp	½ cup	90	..	23	1	101
Smelts	3 whole	50	..	9	1	45
Trout, brook	1 piece, 2"x 1½"x 1" ...	50	..	9	1	45
Tuna, canned, A.P.	½ cup	80	..	11	1	53
Nuts						
Almonds	30 nuts	30	6	6	18	210
Peanuts	35 nuts	30	7	8	12	168
Pecans, medium...	12 nuts	30	5	3	21	221
Walnuts, English..	7 nuts	30	4	6	19	211
Animal Fats						
Bacon drippings...	1 T.	15	..	..	15	135
Chicken and goose fat	1 T.	15	..	..	15	135
Lard	1 T.	15	..	..	15	135
Oleomargarine ...	1 T.	15	..	..	12	108
Vegetable Fats						
Avocado pear.....	½ medium A. P.	120	9	4	15	187
French dressing...	1 T.	15	..	..	10	90
Mayonnaise	1 T.	15	..	..	15	135
Mineral oil mayonnaise	1 T.	15	..	..	0	0
Olive oil and other salad oil........	1 T.	15	..	..	15	135

DIABETIC DIETS—*Continued*

Food Materials	*Approximate Measure*	*Weight Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*
Vegetable Fats—Continued						
Olives, green	4-5 olives	25	3	..	7	75
Olives, ripe.......	4-5 olives	25	1	..	6	58
Peanut butter.....	2 T.	30	5	9	14	182
Miscellaneous Fats						
Chocolate, A. P. ..	1 square	30	9	4	15	187
Chocolate, milk ..	1 piece, 2¼"x 2"x 1" ...	30	15	2	11	167
Cocoa, dry	2 tsp.	5	2	1	1	21
Cocoanut, fresh ...	1 slice, 2"x 2"x ½".....	34	9	2	17	197
Cocoanut, dried ..	¼ cup	21	7	1	12	140
Miscellaneous Carbohydrates						
Corn syrup	1 T.	30	25	..	..	100
Honey	1 T.	30	24	..	..	96
Maple syrup......	1 T.	30	21	..	..	84
Molasses	1 T.	25	17	..	..	68
Sugar, granulated .	2 T.	30	30	..	..	120
Sugar, cube.......	1 cube	7	7	..	..	28
Sugar, domino	1 domino	6	6	..	..	24

TABLE III [7]

BREAD			
Weight Grams	*Coh.* Grams	*Protein* Grams	*Fat* Grams
15	8.0	1.3	0.3
20	10.6	1.8	0.4
25	13.0	2.0	0.5
40	21.0	3.6	0.8
50	26.5	4.5	1.0
60	31.8	5.4	1.2
75	39.7	6.7	1.5
100	53.0	9.0	2.0

PEANUT BUTTER			
Weight Grams	*Coh.* Grams	*Protein* Grams	*Fat* Grams
15	2.5	4.3	6.9
20	3.4	5.8	9.3

CREAM (40%)			
Weight Grams	*Coh.* Grams	*Protein* Grams	*Fat* Grams
30	0.9	0.6	12
35	1.0	0.7	14
40	1.2	0.8	16
50	1.5	1.0	20
60	1.8	1.2	24
70	2.1	1.4	28
80	2.4	1.6	32
85	2.5	1.7	34
90	2.7	1.8	36
100	3.0	2.0	40
120	3.6	2.4	48
125	3.7	2.5	50
130	3.9	2.6	52
140	4.2	2.8	56
150	4.5	3.0	60
175	5.2	3.5	70
180	5.4	3.6	72
190	5.7	3.8	76
200	6.0	4.0	80

[7] Courtesy of Miss Daisy Ellithorpe.

TABLE III—*Continued.*

BUTTER

Weight Grams	*Fat* Grams	*Weight* Grams	*Fat* Grams	*Weight* Grams	*Fat* Grams	*Weight* Grams	*Fat* Grams
2	1.7	28	23.8	53	45.0	78	66.3
3	2.5	29	24.6	54	45.9	79	67.1
4	3.4	30	25.5	55	46.7	80	68.0
5	4.2	31	26.3	56	47.6	81	68.8
6	5.1	32	27.2	57	48.4	82	69.7
7	5.9	33	28.0	58	49.3	83	70.5
8	6.8	34	28.9	59	50.1	84	71.4
9	7.6	35	29.7	60	51.0	85	72.2
10	8.5	36	30.6	61	51.8	86	73.1
12	10.2	37	31.4	62	52.7	87	73.9
13	11.0	38	32.3	63	53.5	88	74.8
14	11.9	39	33.1	64	54.4	89	75.6
15	12.7	40	34.0	65	55.2	90	76.5
16	13.6	41	34.8	66	56.1	91	77.3
17	14.4	42	35.7	67	56.9	92	78.2
18	15.3	43	36.5	68	57.8	93	79.0
19	16.1	44	37.4	69	58.6	94	79.9
20	17.0	45	38.2	70	59.5	95	80.7
21	17.8	46	39.1	71	60.3	96	81.6
22	18.7	47	39.9	72	61.2	97	82.4
23	19.5	48	40.8	73	62.0	98	83.1
24	20.4	49	41.5	74	62.9	99	84.1
25	21.2	50	42.5	75	63.7	100	85.0
26	22.1	51	43.3	76	64.6		
27	22.9	52	44.2	77	65.4		

SUBSTITUTES [8] *

SUBSTITUTIONS FOR ASPARAGUS—100 gms. Chy.—3

String Beans	80	Onions, cooked	60
Beets	40	Onions, raw	30
Brussels Sprouts	100	Green Peas, fresh	20
Cabbage	50	Radishes	50
Carrots	50	Sauerkraut	80
Cauliflower	100	Spinach	100
Celery	100	Squash, summer	60
Cucumber, fresh	100	Tomatoes	80
Egg Plant	100	Turnips	40

[8] Courtesy of Miss Charlotte Sloan, Stanford University Hospital, San Francisco, Cal.

* Estimates are slightly lower than author's tables.

Substitutions for String Beans—100 gms. Chy.—4

Asparagus	130	Onions, cooked	80
Beets	60	Onions, raw	40
Brussels Sprouts	130	Green Peas, fresh	25
Cabbage	70	Radishes	70
Carrots	70	Sauerkraut	100
Cauliflower	130	Spinach	130
Celery	130	Squash, summer	80
Celery, fresh	130	Tomatoes	100
Cucumber	130	Turnips	50
Egg Plant	130	Squash, winter	40

Substitutions for Cabbage—100 gms. Chy.—6

Asparagus	200	Parsnips	50
String Beans	150	Green Peas, fresh	40
Beets	80	Radishes	100
Brussels Sprouts	200	Sauerkraut	150
Carrots	100	Spinach	200
Cauliflower	200	Squash, summer	120
Celery	200	Tomatoes	150
Celery, fresh	200	Turnips	80
Egg Plant	200	Squash, winter	60
Onions, cooked	120		

Substitutions for Beets—100 gms. Chy.—7

Cabbage	130	Green Peas, fresh	50
Carrots	130	Spinach	270
Cucumbers	270	Squash	90
Onions, cooked	130	Turnips	100
Parsnips	65	Green Lima Beans	50

Substitutions for 15 gms. of Cornflakes

Puffed Rice	15 gms.
Cream of Wheat	16 gms.
Farina	16 gms.
Force	16 gms.
Grapenuts	16 gms.
Rolled Oats	18 gms. minus 1.5 P. and 1 F.
Triscuit	16 gms.
Bread	24 gms. minus 1 P.
Orange Juice	85 gms.
Oranges	100 gms.
Grapefruit	170 gms.
Strawberries	170 gms.
Muskmelon	120 gms.

Substitutions for 50 gms. of Orange Juice
(7 Carbohydrate)

Apples	47		
Apricots, fresh	55	Water packed	100
Blackberries, fresh	90	Water packed	110
Cranberries	90		
Grapefruit	100		
Muskmelon	70		
Orange	60		
Peach, fresh	80	Water packed	125
Pear	50	Water packed	100
Raspberries	55	Water packed	80
Strawberries	100	Water packed	125
Watermelon	100		

Substitutions for 50 gms. of Peach or 100 gms. of Water Packed Peaches
(5 Carbohydrate)

Blackberries	60	Water packed	75
Grapefruit	70		
Cranberries	60		
Muskmelons	50		
Orange	40		
Orange Juice	35		
Rhubarb	175		
Strawberries	70	Water packed	90
Watermelon	70		

Substitutes for Meats

Substitutions for 50 gms. of lean beef, lamb, or veal.

American cheese, 45 gms. minus 14 gms. oil or 15 gms. of butter.
Bacon, crisp (a) 40 gms. or (b) 20 gms. bacon plus 1 egg and minus 7 gms. of oil.
Brie, 85 gms. minus 15 gms. of oil and minus 50 gms. of lettuce.
Cottage cheese, 65 gms. minus 19 gms. of oil.
Corned beef, 85 gms. minus 19 gms. of oil.
Eggs, 2 minus 10 gms. of butter or oil.
Flounder (sole), 80 gms.
Halibut, 60 gms. minus 5 gms. oil or butter.
Ham or pork, 55 gms. minus 5 gms. butter.
Liver, 65 gms. minus 5 gms. butter or oil.
Salmon, canned, 60 gms. minus 5 gms butter.
Salmon, fresh, 55 gms. minus 5 gms. butter.
Sardines, 60 gms. minus 10 gms. butter or 9 gms of oil.
Sweetbreads, 65 gms. minus 5 gms. of butter.
Tongue, 70 gms. minus 5 gms. butter or oil.

Fat Substitutes

For

10 gms. of butter—	15 gms. of butter—
8 gms of oil	13 gms. of oil
8 gms. of mayonnaise	13 gms. of mayonnaise

Training the Patient.—The instructing of the diabetic patient in the hospital, calls for the co-operation of physician, dietitian, nurse and patient. The training may be in the form of lectures, demonstrations, and tests.

It is more interesting to the patient if the instruction be given in groups; however, this is a question to be solved by the hospital staff. A workable schedule has been found in the following procedure: 1 to 2 days each week, lectures or talks by physician, dietitian, or nurse on (1) character of the disease, (2) recognition of symptoms, (3) value of diet, (4) character of diet, (5) food values, (6) charting, (7) need for urine tests, (8) if insulin is used, the method of procedure; 1 to 2 days a week on weighing and measuring of food, and of food preparation; 1 day for making the urine tests and learning to chart diet correctly.

The patient must be taught the fundamental principles governing his condition; the reasons for the various dietary regulations ordered by the physician; the importance of recognizing any unfavorable symptoms, and the absolute necessity of calling on the physician for assistance before the trouble passes beyond the reach of treatment. He must likewise be instructed in the use of the various pieces of equipment, scales, test tubes, solutions, and other materials for making the urine tests; and in the preparation of such necessary food formulas as require special directions.

Use of Scales.—In the hospital the patient is taught to use the gram scale, these scales are expensive and it is frequently impossible for a patient to purchase them (unless they are purchased by the O. P. D. and sold at a minimum price). However, it is necessary for the food to be weighed, especially when insulin is taken, until the patient has learned to measure accurately. The food tables are estimated in grams, and the carbohydrate, protein and fat content given in grams; hence it should not be difficult to make use of such scales and thereby eliminate the possible

danger arising when less accurate measures are used. There are several types of scales on the market—"Harvard Trip Scales," the type of balances usually used in university and college dietetic laboratories; Chattilon Food Scale, a spring scale of sufficient accuracy with a movable dial, allowing the vessel used for holding the food to be weighed first and accounted for; the "Cellu Scale," Chicago Dietetic Supply House, any of which should give perfect satisfaction in weighing the day's allowance for the diabetic.

Table of Weights and Measures.—It is not necessary that the patient should go to the trouble of learning the metric system in its entirety. This is a difficult thing for many to manage; hence just those units of measurement which are essential for the weighing of his diet, the estimation of his own weight, and the making of the urine tests are all that need be taught him; *e.g.*

1 ounce	(oz.)	=	30 grams (gm.) or 30 c.c. (liquid)
5 c.c.	(1/6 oz.)	=	1 (fluid) teaspoon (tsp.)
10 c.c.	(1/3 oz.)	=	1 " dessertspoon (dsp.)
15 c.c.	(1/2 oz.)	=	1 " tablespoon (tbs.)
15 gm.	(1/2 oz.)	=	1 tbs. sugar, butter, oil, cream
240 c.c.	(8 oz.)	=	Average standard measuring cup
2.2 pounds	(lb.)	=	1 kilogram (kgm.)

Other Apparatus Required by Patient.—In addition to the scales that patient should supply himself with the following articles:

1. Measuring cup, made of tin, aluminum, or glass.
2. Graduate for measuring urine (quart, pint or half pint bottles may be used for the purpose).
3. Vessel of sufficient size to hold the entire 24-hour specimen.
4. 4-oz. bottle to carry specimen to physician for examination.
5. 3 test tubes, 1 test tube brush, or cotton for swab to clean test tubes.
6. Benedict's "Qualitative Solution" for making sugar test.
7. Ferric chloride solution (10%), for making diacetic acid test.

8. Thymol (10% solution in alcohol) for preserving the urine (using 1 teaspoonful in first specimen of the 24-hour quantity).
9. 1 eye dropper for use in making the urine test.
10. The patient may use a small saucepan in which to boil the test tubes in making urine tests. When using saucepan place tubes in boiling water and allow to boil 5 minutes (instead of 3 minutes, the time required when holding tube in an open flame).

Urine Tests for Patients.—To save time in looking up tests in another chapter, the following instructions are included for use of patients. Each patient should thoroughly understand how to make these tests before leaving the hospital, or before he is left to make them at home.

For Sugar.—Pour 1 tsp. (5 c.c.) Benedict's Solution into a clean test tube and add 8 to 10 drops (no more, using a dropper for the purpose) of the urine to be tested. Either boil the test tube over the flame for 3 minutes, or place in a saucepan of boiling water and boil briskly for 5 minutes. If the specimen contains sugar, the contents of the tube will be cloudy and a precipitate will form throughout the specimen. This precipitate will be of a greenish yellow, or red color, depending upon the amount of sugar present. It is a good rule to advise the patient to carry a specimen to the physician when the sample which he tests for himself is cloudy; 4 oz. is a sufficient quantity to take to physician. When the morning or evening specimen shows sugar it is advisable for a patient to test also for diacetic acid. This is known as the "Gerhardt, or Ferric Chloride test for Diacetic Acid," and is made as follows:

Pour 1 teaspoonful (5 c.c.) of freshly voided urine into a clean test tube; now add ferric chloride (10% sol.) drop by drop from eye dropper, noting the changed of color as the solution is added. In the presence of diacetic acid, the color of the specimen changes to a wine red. Ferric chloride

solution is added until there is no further deepening of the color. Then one-half of the specimen just tested is poured into a second tube, and this tube is heated over the flame or in boiling water for 5 minutes. If diacetic acid is present, the color will fade to a lighter color. If, however, the patient has been taking aspirin or antipyrin, the color will be a bluish red and remain so when the specimen is heated.

The danger arising from acidosis and coma, indicated by the presence of diacetic acid in the urine, must be impressed upon the patient; he must be warned to recognize this as well as other symptoms of acidosis. He should visit his physician at once.

For Acetone.—Rothera's nitro-prusside test. To 5 c.c. of the urine is added a little solid ammonium sulphate or a few drops of a saturated solution, 2 or 3 drops of a freshly made 5 per cent solution of sodium nitro-prussid solution, and 1 or 2 c.c. of concentrated ammonium hydroxide. If acetone is present, a permanganate color develops. One plus means acetone from 1-500 to 1-200; two plus means 1-200 to 1-100; three plus means 1-100 to 1-20; and four plus means about ten per cent or more of acetone.

Teaching the Fuel Value of Food.—The calorie is the unit of measurement used for measuring the amount of heat produced by food. Each foodstuff is capable of producing a certain number of calories or heat units. Teach the patient that:

1 gram of carbohydrate	will	produce	4	calories	of	heat
1 " " fat	"	"	9	"	"	"
1 " " protein	"	"	4	"	"	"

Show the patient that if his diet calls for 30 grams of carbohydrate, 50 grams of protein and 125 grams of fat, that he will be receiving approximately

4× 30= 120	calories	from	carbohydrates	in	his	diet	daily
4× 50= 200	"	"	protein	"	"	"	"
9×125=1125	"	"	fat	"	"	"	"

Total of 1445 calories per day.

Impress the patient with the fact that while in normal health he may be able to utilize a daily intake of 3000 or more calories per day, that under the circumstances (diabetes), he will not be able to take so much food, on account of his lowered capacity for handling the carbohydrates.

In teaching the *selection* of foods, group the food materials according to their carbohydrates, protein, and fat content. For example, sugar, bread, cereals, macaroni, rice, potatoes in a group marked *carbohydrates;* milk, meat, eggs, cheese, under the head of *protein;* and butter, various salad oils (except mineral oils), bacon, cream, peanut butter, etc., under the head of *fat.* In this way the patient will soon associate the food materials with their foodstuffs equivalent.

Charting the Diet.—It is advisable to teach the patient how to record his daily intake of food, both in terms of carbohydrates, proteins, and fats, and in vegetables, eggs, meat, cream, etc.

It is likewise necessary to show that any food which is not eaten must be recorded, since in balancing the diet that alone counts. It is well also to record the value of the diet in calories. The result of the daily urine test must be available for the physician. When the urine shows the presence of sugar, it is necessary to test also for acetone bodies (diacetic acid and acetone).

A copy of the following rules should be given each patient upon leaving the hospital; they will serve to remind him of the important points in the care of his body:

(1) Visit the physician regularly.

(2) Give proper care to the teeth, careful brushing after each meal, and at least two visits a year to the dentist, oftener if there are any indications of decayed teeth, abscessed teeth, or pyorrhea. Make certain that the dentist knows of the diabetic condition in case of need for removing a tooth.

(3) Observe regular habits of exercise, rest, sleep and diet, according to direction given by physician.

(4) Avoid all sorts of infections and contagious diseases, skin infections, etc.

(5) Report at once to the physician in case of such infections developing.

(6) Avoid constipation; this condition is likely to occur in diabetes, and should be prevented if possible by using coarse vegetables, washed bran or Agar biscuits, jelly, etc., or mineral oil dressing on salads.

(7) Should diarrhea develop, as it sometimes does in diabetes, omit the bran, agar, and mineral oil. Raw fruit should be left out of the diet, and the vegetables should be cooked and strained before serving.

(8) Avoid excitement and worry; the disease is more or less aggravated by emotional disturbances.

(9) The body should be kept scrupulously clean. Bathe frequently, but observe care in drying the skin, especially the feet, since lack of care in this particular may lead to skin irritations. Dust the feet with powder after drying them.

(10) Adhere strictly to the physician's orders; do not add to or take away from the diet, but fill the prescription exactly as it is given. If it is to be changed, the physician will make the necessary adjustments.

(11) Test the urine at least once a day. This is best done 2 hours after the meal heaviest in carbohydrates. Some physicians direct the test made in the morning and evening, instead of the first mentioned time, but this question must be settled by the physician before the patient leaves the hospital. If the specimen shows the presence of sugar, it is advisable to follow the sugar test with one for diacetic acid.

The Teaching of Food Preparation.—A few of the most essential rules for preparing foods for the diabetic may be

necessary before the patient leaves the hospital. Those advisable for home use are: bran cakes, or muffins, for which the recipe must be taught for the preparation of the starch free bran (that purchased already washed is, as a rule, safer, but much more expensive); soups containing little carbohydrates—these may be thickened with egg or with India gum; custards, made with 20% cream; Agar jellies, mayonnaise, made either with olive oil or mineral oil (the latter is especially useful in diabetes complicated with constipation); white sauce, made without starch as a thickening agent. Most of these recipes may be found in the section devoted to laboratory practice (pages 144 to 175).

CHAPTER XXI

DISEASES OF THE LIVER

MUCH of the so-called biliousness from which the human family is so prone to suffer is nothing more or less than one of Nature's danger signals by means of which man may understand that some part of the delicate organism called the human body is being overworked. Close investigation of these conditions has proved that it is the liver which has been overtaxed, in many cases to such an extent that in a measure it slows down, as any overtaxed machine will do, and has become clogged with material which, owing to its condition, it is not able to prepare properly and send out on time.

Work of the Liver. — When one considers the vast amount of work performed by this organ, one marvels that so little trouble is manifested. In another part of this text the functions of the liver were defined. It was found to be the largest secretory organ in the body, producing a constant supply of bile by means of which the fats were dissolved and the digestion and absorption of the other food materials facilitated. We likewise found that the greater part of the fuel foods was transformed within this organ into available energy, either for immediate or future use.

As a Detoxifying Agent. — To the liver must also be credited the detoxifying of the various poisons produced within the body during the process of metabolism or brought in by way of food. Too much cannot be said as to the value of the liver in this respect, the importance of which is made known as soon as anything happens to the organ to put it even temporarily out of commission.

Causes of Liver Disorders. — Is it any wonder, then, that with such abuses as overeating and drinking, especially of those foods rich in fats and carbohydrates which depend upon the liver for their availability in the body, Nature cries aloud for help and for the comparative rest of this, her largest organ?

The taking of alcohol in excess has been found to bring about tissue changes in the liver. Hence it must be avoided by individuals with a tendency to biliousness or to any disease in which the liver is involved.

The Bowels. — The bowels are as a rule constipated, and one of the first means of relief is the overcoming of this condition. The method of doing this depends upon the individual, and the treatment must be decided on by the physician.

Dietetic Treatment. — The dietetic treatment consists in abstaining from food or reducing the amount to a minimum while the attack lasts and while the intestines are being thoroughly emptied. All stagnant material which has clogged the bowels and which has been subjected to the activities of putrefactive bacteria must be gotten rid of. The diet must be especially low in fat. Oyster or clam broth, soft-cooked eggs, toast, cereal, or rice, with a little milk instead of cream and very little sugar, tea, and baked apple or stewed prunes are given.

Convalescent Diet. — After the attack the diet may be gradually increased until it is again normal. Moderation must be observed in the amount of food eaten; no highly seasoned or spiced foods, pickles, or condiments, such as peppers, mustard, or horseradish, should be taken. Salads should be dressed without oil. Lean beef, lamb chops, fish, chicken, sweetbreads, quail, squab, eggs (except fried or hard cooked), green vegetables (except radishes, onions, watercress, and celery) in abundance, a small amount of potato, rice, or tapioca, fresh and cooked fruit with little, if

any sugar, junket, custards, fruit jellies, weak tea and coffee should constitute the diet. Certain individuals find that milk increases the tendency to constipation; this is probably due to the small amount taken; large quantities do not as a rule produce this effect. Buttermilk, koumiss, and modified milk are advised in severe cases.

Diet for Constipation. — Individuals inclined to biliousness should endeavor to overcome the constipation which is one of the most prominent features. This is done by proper diet more successfully than by drugs (cathartics): bran bread, vegetable soup, fresh fruit, stewed fruit, fruit beverages, plenty of water. The following menus are suggested:

Breakfast — Stewed prunes
Oatmeal with milk (no sugar)
Weak tea or coffee
Toast (milk toast or dry toast)

Lunch — Tomato soup
1 small baked potato
1 lean lamb chop (broiled) or a poached egg on toast
Cup of weak tea

Dinner — Vegetable soup
1 slice of lean, rare beef (cut from the inside of the roast)
Spinach
Rice
Lettuce and tomato salad
Lemon jelly

Breakfast — Grapefruit
Hominy with milk
Poached egg on toast
Weak coffee (milk and little sugar)

Lunch — Cream of green pea soup
Tomato jelly
Broiled sweetbreads
Weak tea
Toast

Dinner — Small portion of lean lamb or chicken
Boiled or mashed potatoes
String beans
Sliced tomatoes
Prune whip

Advice to Patient. — The above menus are merely suggested. The diet may be selected from the list of foods already mentioned. The patient must be warned against overeating and drinking. Pastry, rich cakes and puddings, confectionery, gravies, etc., must be avoided. In certain individuals beer will induce a bilious attack. By them it should be avoided.

CIRRHOSIS OF THE LIVER

The cause of this disease and the stage in which it exists must determine the treatment necessary. However, it matters not what produced the disease, whether it is the result of alcoholism, syphilis, etc., the diet plays an important rôle in its cure.

The Diet. — The diet in this disease, as in any other, must be determined by the condition of the patient. Unfortunately, many patients do not know of their condition until the disease is well advanced and symptoms of obstruction are prominent. A study of these must be made before the diet can be formulated. When the symptoms are mainly those arising from disturbed digestion of the stomach and intestines, without kidney or heart complication, the diet for chronic gastritis is used.

Restricting the Fluids. — When the heart is involved, it

is sometimes found necessary to restrict the fluids (dry diet) to 1 quart (about 1000 c.c.) per day. The Karell Diet has been used advantageously in many of these cases. In cases where the kidneys are involved, the diet will depend upon the condition of these organs.

Restricting the Diet. — The diet in any case must be restricted. Individuals with a tendency to cirrhosis and those coming of a family in which liver diseases are frequent should be especially warned about the dangers of overeating and drinking. Alcohol should be avoided especially by such individuals. They should keep their diet simple in character and moderate in amounts.

Avoidable Foods. — All foods, such as condiments and spices, meat extracts, the outside browned portions of roasted meat, alcoholic beverages, which exert a stimulating or irritating effect upon the liver, should be studiously avoided and the fats and carbohydrates restricted, since, as it has already been demonstrated, it is upon the liver that the body depends for the preparation of these substances for their utilization. When, for example, the flow of bile is lessened, an incomplete emulsification of the fats exists and the fatty acids which are highly acid in character cannot be efficiently dissolved or neutralized, or when the liver is diseased and for this reason the conversion of glycogen into glucose is interfered with, the utilization of the carbohydrate foods is thus impaired.

GALLSTONES

Factors Influencing Their Formation. — According to Friedenwald and Ruhräh [1] the two factors that in all probability exert the most influence on the formation of gallstones are the stasis of bile and the inflammation of the bile passages and gall bladder.

Dietary Rules. — There are certain dietary rules which

[1] "Diet in Health and Disease," p. 399, by Friedenwald and Ruhräh.

should be observed by all persons who have had gallstone attacks. These are (1) to prevent stasis of bile, (2) to avoid fats. Everything should be done to prevent the formation of the stones, and this can only be accomplished by observing these rules. The flow of bile must be free; this is encouraged by keeping the intestinal tract in good condition.

Stimulating Peristalsis. — Peristalsis must not be allowed to become sluggish, for it is only during the process of digestion when the food mass passes along the intestinal canal that there is an ejection of bile into the intestines. When the passage is abnormally slow the bile is in a measure dammed back with a formation of gallstones as a result. The restriction of the fats has already been discussed in another part of the chapter. It has been demonstrated that these substances have a chemical influence upon the formation of gallstones as well as upon the intestinal stasis which leads to their formation.

Dietetic Treatment. — Hence the diet should be so directed as to (1) increase the flow of bile, and (2) to avoid all foods that are liable to cause indigestion which may bring about putrefaction in the intestinal tract and a consequent irritation and inflammation of the bile passages and gall bladder.

The meals should be regular and an abundant diet advised to increase the flow of bile and stimulate peristalsis in the intestines.

Exercise. — Exercise is especially recommended. Horseback riding, swimming, rowing, golf, and tennis are especially valuable in forcing the bile from the gall bladder and liver.

The Clothing.—The clothing should be loose enough to be perfectly comfortable. Certain gallstone attacks in women in the past have been said to have been traced to tight lacing, which interfered with the normal flow of the bile.

The Bowels. — Constipation should be avoided, and the diet should be directed with this point in view. The meals must be frequent, ranging from four to six a day. In this way only is the flow of bile encouraged. The breakfast should be ample in order to utilize the bile secreted in the night season. With all this, care must be observed not to give more food than can be adequately handled by the digestive apparatus, since food which is not digested becomes a prey to the actions of the putrefactive bacteria which infest it, and the toxic substance thus formed produces the very result which all of our efforts are directed to prevent.

Available Foods. — The following foods **low in fats** may be used in formulating the diet:

Soups: Meat broth (made from lean meat) from which all the fat has been removed.

Meats: Lean beef, lamb, chicken, squab, quail, lean fish (in small quantities and not too frequently).

Green vegetables: Except peas and carrots; beets and turnips may be taken sparingly.

Fruits: Oranges, lemons, grapefruit, and unsweetened stewed fruit.

Cereals: Wheat cereals, oatmeal, rice, and tapioca in moderation.

Bread: Whole wheat, white, rye, and graham bread, toast, and crackers.

Fluids: Weak tea and coffee (without cream, and a little sugar), orange and lemonade, mineral waters, water, skimmed milk, whey.

Eggs: (white only).

Desserts: Fruit gelatin, fruit whips, raw or stewed fruit.

Avoid the following foods: Fats, oils, mutton, liver, brains, sardines, and caviar, oily fish, rich gravies and sauces, sweet fruit, peas, carrots, condiments and spices, pastry and confectionery, pickles, alcoholic beverages. Restrict carbo-

hydrates, yolks of eggs, milk (cream must be skimmed off if too rich).

DAILY DIET SHEETS

I

Breakfast — Baked apple with milk
Cream of wheat with milk
Weak coffee or tea
Dry toast

11:30 A.M. — 6 oz. orange juice, 1 egg white

Dinner — Beef broth (well skimmed) with crackers
Rice
Stewed pears
Weak tea
Toast or rolls

3:30 P.M. — Albumenized fruit juice with crackers

Supper — Wheatena with milk
Milk toast
Stewed prunes
Toast and tea

9 P.M. — Well-skimmed chicken broth with crackers

II

Breakfast — Stewed apples with milk
Milk toast
Coffee without cream

10:30 A.M. — Well-skimmed broth with crackers

Dinner — Tomato bouillon with crackers
Baked potato — 1 small potato
Purée of spinach
Orange gelatin
Toast

3 P.M. — Albumenized lemonade

Supper — Oatmeal or cream of wheat with milk
Toast
Tea
Stewed fruit

9 P.M. — Well-skimmed broth with crackers

III

Breakfast — Grapefruit
Oatmeal with milk
Toast
Weak coffee

10:30 A.M.— Orangeade with graham crackers

Dinner — Cream of spinach soup (skimmed milk)
Small piece of the breast of chicken
Mashed or boiled potatoes
Asparagus on toast
Sliced oranges

3:30 P.M. — Well-skimmed broth with crackers

Supper — Farina or cream of wheat or wheatena, with milk
Baked potato
Baked apple with milk
Toast and tea

9 P.M. — Albumenized orange juice

IV

Breakfast — Sliced oranges
Oatmeal
Toast
Coffee

10:30 A.M.— Beef gruel, 6 oz.

Dinner — Cream of asparagus soup, skimmed milk
Thin slice of roast beef or whitefish
Rice or potatoes
Tender string beans
Fruit
Toast
Buttermilk

3:30 P.M. — Orangeade

Supper — Stewed fruit with puffed wheat or rice
Milk toast
Tea

9 P.M. — Broth

SUMMARY

Functions of Liver. — To transform fuel foods into available energy; to detoxify those poisonous substances produced as the result of metabolism of body tissue or brought in in food, and to select those available for use; to secrete bile.

Factors Influencing Disorder of Liver. — Errors in diet: (*a*) overeating; (*b*) excessive drinking; and (*c*) unbalanced diet, especially as regards the amount of fats and carbohydrates in the diet.

The Bowels, in most of the disturbances affecting the liver, become constipated, thus causing much additional work on the part of the liver in handling the products produced as the result of putrefactive bacteria upon the accumulated mass in the colon.

Tissue Changes in the liver have been caused by the taking of alcohol, which should therefore be avoided by all individuals having any disease involving the liver and by those with a predisposition to liver disturbances.

Exercise and Lack of Exercise are potent factors in the treatment of conditions involving the liver. First, because the liver requires exercise to enable it to empty itself more completely and assure a free flow of bile; second, because exercise directly affects the energy output of the body, causing an increased rate of metabolism and a better utilization of the food ingested. Lack of exercise acts in exactly the opposite direction, and it has been found that with the majority of patients suffering from diseases of the liver too little exercise and too much food are at the bottom of the trouble.

Dietetic Treatment in the majority of diseases affecting the liver is much the same. The keynote in each is a balanced diet. Constant overeating and excessive drinking have proved the foundation of the majority of such diseases, especially of the bilious type, while an excess of fat and carbohydrates in the diet lead to the more serious disorders.

Biliousness requires abstinence from food for a short period and a cleansing of the entire gastro-intestinal tract, the measures being directed by the physician. After the bilious symptoms have subsided, a simple, well-regulated diet should be established, in which no rich foods of any sort are allowed. All condiments and spices which have an astringent effect upon the bowels are strictly prohibited, and alcoholic beverages had best be eliminated from the diet.

Cirrhosis of the liver is apt to be insidious in its development, taking a firm hold before the character of the disorder is discovered. Dietetic treatment of this disturbance is most important and should be directed toward overcoming not only the liver symptoms but other symptoms as well.

Gastro-intestinal Disturbances, manifested in cirrhosis of the liver, are treated by the diet used in chronic gastritis (see pages 301-302-303).

Heart Symptoms sometimes occur during the course of

the disease and require especial attention to the diet. The fluids at times must be restricted, in which case a modification of the Karell Diet will prove valuable (see pages 403-437).

Kidney Complications develop in a certain percentage of cases, and it then becomes necessary to institute one of the various diets devised to meet the needs of those special conditions (see Chapter XVIII).

Restricting the Diet will be found to be necessary for those individuals showing a tendency to cirrhosis, also for those in whose family diseases of the liver are of frequent occurrence. Such individuals should be warned of the dangers arising from overindulgence in food or alcoholic beverages.

Prohibited Foods are those which by reason of their astringent qualities favor the development of constipation, such as condiments and spices; those foods which exert a stimulating and irritating effect upon the liver and bile passages, such as alcohol, malt extractives, etc.; and fats and carbohydrates in excessive quantities, on account of the extra amount of work required of the liver in order to make them available in the body.

Gallstones develop as the result of inflammation or clogging of the bile passages.

Treatment is dietetic in character and is directed toward relieving or preventing inflammation in the bile passages, also in stimulating the flow of bile in order that it may not become sluggish and thus give rise to the development of the gallstones.

The Fats, therefore must be restricted in the diet, as they, more than any of the other food constituents, favor the above conditions.

Peristalsis in the intestinal tract must be stimulated to facilitate a free flow of bile, which will not occur where the movements are sluggish. Stasis of the bile must be prevented or stones will be apt to form.

Dietetic Treatment for gallstones is therefore directed to increase the flow of bile and to avoid the inflammation of the gall bladder and bile passages which may result from the product of intestinal putrefaction.

The Diet consists of foods simple in character, low in fats, but abundant in quantity, in order to prevent constipation. It must be selected carefully that digestional disturbances may not develop.

The Meals should be frequent, from four to six a day, in order to encourage a free flow of bile.

Breakfast should be ample in order that the bile secreted and accumulated during the night may be utilized as soon as possible.

Constipation must be avoided, and the foods particularly adapted to prevent or overcome this condition should have a prominent place in the diet. Any accumulation of unabsorbed food in the lower intestines becomes a breeding ground for putrefactive bacteria, the product of whose activity imposes a serious tax upon an already overworked organ.

PROBLEMS

(*a*) Formulate a diet for a patient suffering from gall stones. Outline method of administration.

(*b*) List available foods for diets used in disturbances of the liver. List the foods to be avoided in such cases.

CHAPTER XXII

OBESITY

Body weight as a measure and possible indices to health and longevity, has long been recognized as a definite factor, the importance of which should not be underestimated.

Abrupt gains or losses in weight may be the result of changes in habits or environment, but they are quite as likely to be an indication of the presence or onset of disease, hence should not be disregarded.

Unfortunately, a number of so-called obesity cures have been foisted upon the public, and the demands of fashion for a slender boyish figure in women have fostered the fakers until it has become necessary to look carefully into any scheme for the reduction of weight before putting it into use. Some of the "cures" have little to recommend them, from a reduction standpoint, while others include certain drugs which undoubtedly assist in reducing the weight, but are dangerous except in the hands of physicians who know their value and can regulate their use for the individual.

It is quite impossible to lay down a set law or rule for reducing all overweight individuals, the types of obesity are quite as distinct as types in other abnormal or metabolic conditions. Consequently each case must be examined classified, and treated according to the individual needs, and the physician prescribes the diet, as well as the medical treatment.

Classification.—Obesity may be classified under three main heads:

(1) Exogenous; due presumable to an excessive intake of food (long continued), combined with too little exercise;

(2) Endogenous; showing a disturbance of the endocrines and associated more or less with a lowered power of oxidation or combustion;

(3) Constitutional; characterized by an inability on the part of the individual to lose weight regardless of a material reduction in the food intake (daily energy intake of 600 to 1000 calories).

The first or exogenous type of obesity is clearly the only one which can be adequately and satisfactorily handled by dietary management. The second type, in which the disturbance is associated and probably due to a disturbance in the endocrines and possibly other ductless glands, must be left until more definite information can be secured on which to base our dietary adjustments.

The third or "constitutional type is very common, but attempts to reduce such patients by dietary management alone, has met with discouraging results and in many cases failure. This failure, Dr. DuBray claims can be accounted for by the way in which such individuals utilize the food eaten, he claims that constitutionally obese individuals show an unusual economy in their use of food, that the organism will accommodate itself to a surprisingly low intake of food over an extended period without loss of weight. DuBray has found little difference in the metabolic rate of constitutionally obese patients over that of the average individual, but he did see a tendency on their part to a lowering of the special dynamic action of the proteins.

In other words, under normal conditions, and in overweight individuals coming under the head of exogenous obesity, the proteins in food, if taken in excess of the average body requirements, have a tendency to speed up the engine thereby forcing the burning of the fuel material stored in the tissues and preventing an accumulation of fat.

In some cases it has been found possible to make use of this knowledge of the stimulating properties of protein,

by giving a diet containing a high percentage of protein with a correspondingly low intake of carbohydrates and fat. But this is not always feasible; the end products of protein metabolism are eliminated almost entirely, by way of the kidneys, consequently in cases showing signs of kidney disturbances, or sclerosis, with an impairment of the myocardium, it would be distinctly inadvisable to raise the protein content of the diet to a point which might possibly endanger the life of the patient.

The introduction of drugs, or the use of thyroid preparations to stimulate the metabolic rate and assist in the breaking down of body tissue, has no place in a text book on dietetics for nurses, such measures belong to the medical treatment, hence are entirely in the hands of the physician.

The dietary adjustments for exogenous type of obesity will be considered here, since the other types are still under investigation, and no data of sufficient authenticity has been given us on which to base a reliable dietary management. This type, however, is the one most commonly met with. Efforts may be made to cover the need of other types, but their results must be considered as problematical.

Certain general health rules must be instituted in all cases of exogenous obesity, (1) the patient must take a certain amount of muscular exercise, preferably in the open air, to stimulate the burning up of the accumulation of the fat in the tissues, (2) the taking of naps during the day must be discontinued, (3) no eating between meals, water may be taken *ad libitum,* but no sweetened beverages, such as coco cola, orange crush, etc., (4) the appetite gained as a result of exercise, especially in the open, must not be satisfied by eating, except at meal hours, and only the amount and type of foods called for on the diet list, then (5) there should be one bowel movement each day. The adjustment of the diet should assure this. If constipation is a complication in the obesity, the green vegetables, fruit and mineral

oil dressing should be regulated to overcome the disturbance, whenever it is possible. Care must be observed in adding bran to the diet, since in certain cases of obesity the constipation is more or less spastic in character, and an excess of so-called "roughage" will bring about an irritation in the intestinal tract more harmful than useful.

Dietary Adjustment.—This diet is based on the ideal weight of the patient, rather than the actual weight. In other words, the food intake should be adjusted to meet the body requirements at rest. The accumulation of fuel material in the form of adipose tissue may be used to carry on the external and internal work, thus reducing the stored fat, and, incidentally, bring down the weight of the patient.

The protein intake is based on the nitrogen requirements of the individual, as a rule 1 gram, per kilogram, of body weight is the starting point. If a high protein intake is desired to stimulate the rate of metabolism, 1¼ to 1½ grams of protein, per kilo., may be used. This point, however, is for the physician to determine.

Weight to Height.—The patient's proper weight may be obtained either from the table (see pages 594-595), or by estimating the ideal weight according to the following formula:

Weight at five feet 110 pounds, for each additional inch in height over five feet, add five and a half additional pounds. For example, the *ideal weight* of a woman of five feet five, would be 110, plus 5½ times 5, or 137½ pounds, or 62½ kilograms.

Another method of finding the desired weight for an individual of a certain height and age is: Take height of patient in inches, change to centimeters by multiplying by 2½—subtract 100. The result gives the weight of patient in kilograms: For example—A man 5 ft. 10 inches, 5 ft. 10 inches equals 70 inches, 70 x 2½ equals 175; 175-100 equals 75 kgm., or correct weight for man 5 ft. 10 inches tall.

The Energy or Calorie Requirements.—The total

calories allowed for the day is based upon (1) the needs of the body at rest, (2) upon what the patient should weigh, instead of what he does weigh. As a rule, the resting body requires from 20 to 25 calories per kilo., of body weight, per day. In many cases of obesity, the metabolic rate is materially lowered, hence the lower figure is often a more satisfactory estimate of the energy requirements than the higher one.

If a man weighed 90 kilograms, when he should weigh 75 kilograms, he would be approximately 20 per cent. overweight, and a diet based on his over-weight could not possibly allow of a natural reduction. The calories for the day then, would be estimated to cover his actual needs. In other words, if his normal weight was 75 kilos., and he required 25 calories per kilo. of body weight, his energy requirements for the day would be 1875 calories. To reduce the overweight, the calorie intake would need to be considerably less than his actual requirements, 75 x 20 equals 1500 calories.

On the other hand, if he bases his total calories on his overweight, his calorie intake for the day would be approximately 1800 calories, a mere 70 calories less than he would need if he were not obese. 70 calories represents a loss of 7.7 or 8 grams of adipose tissue a day, a figure too low to be considered, if material reduction is desired.

Estimating the Diet Prescription.—The protein allowance is estimated at 1 gram to a gram and a half (1½ gms.) per kilo. of body weight per day. The carbohydrate and fat allowance is based on the total number of calories allowed for the day, after the protein calories have been deducted. For example, if a patient weighed 75 kilos., and the diet prescription called for 1½ grams of protein per kilo., his protein intake would be 75 x 1½ or 112½ grams of protein. Each gram of protein furnishes 4 calories of heat, 112.5 x 4 equals 450 calories from protein. If the diet prescription called for 1200 calories per day the carbohydrates and fats would have to furnish 1200 — 450 or 750 cal-

ories. To balance the diet, it would be advisable to allow twice as many calories from fats as from carbohydrates. In this case, the carbohydrate calories would amount to 250 calories, and the fats 500 calories, or, in terms of grams, 250÷4=62.5 grams coh. 500÷9=55.5/9 or approx. 56 grams of fat. The diet prescription would then read: Rx. prot. 112.5 gms., coh. 62.5 gms., fat 56 gms., total calories 1,200.

If the protein allowance were based on 1 gm. per kilo. per day the prescription would read: Prot. 75 gms., coh. 75 gms., fat 67 gms., total calories 1,200. If the calories were divided equally between the carbohydrates and fats the diet would contain 112.5 coh. and 50 gms. of fat.

Factors Affecting the Selection of Foods.—The diet is kept normal in every respect, except in low food value.

From 6 to 8 standard 100 gram servings of fruit (10%) and 3%-5% and 10% vegetables are used each day. No desserts other than fruit or fruit gelatin are allowed.

The vegetables of lower carbohydrate content are selected to furnish the bulk of the carbohydrates, because these vegetables are, as a rule, high in iron and vitamins, and the cellulose content of green vegetables is valuable to combat the constipation.

No butter is added to the vegetables, unless the fat quota for the day has not been filled.

Mineral oil is used as a substitute for olive or other salad oils in these obesity menus.

When hypertension is a complication in the obesity, the salt is kept low in the diet.

Fluid (water) is restricted at meals only, but the total intake depends more or less on the accompanying complications.

Tea or coffee may be used in moderate amounts (1 cup for breakfast), unless forbidden by the physician.

Rich soups and all gravies must be omitted.

The following menus demonstrate the method of filling

the diet prescription when definite amounts of protein, carbohydrates and fats are desired:

OBESITY MENU

1000 Calories—Prot., 75 Grams

Food Materials	*Approx. Measure*	*Weight Gms.*	*Prot. Gms.*	*Cal.*
	7:30 A.M.			
Orange juice	½ cup	100	..	56
	Breakfast			
Baked apple	1 small	100	..	56
Egg	1	50	7	73
Toast	1 slice	20	2	52
Coffee without cream or sugar, use saccharin		..	..	..
		..	9	237
	Luncheon			
Lean, cold roast beef	4 thin slices, 4½″x2½″x⅛″	100	14	166
Rye bread	1 slice, 3″x3″x⅜″	20	2	52
Lettuce and	4 leaves	25	5	6
Cottage cheese salad with mineral oil, mayonnaise	4 T.	60	13	69
Junket (skim milk, saccharin)	1 mold	180	6	69
Buttermilk	1 glass	180	5	65
		..	40.5	427
	Dinner			
Boiled cod with lemon	2 pieces, 2″x1½″x1″	100	9	36
Boiled potato	½ potato	50	1.5	46
Cauliflower	¾ cup	100	1	28
Butter	1 tsp.	5	..	36
Watercress and egg salad				
Watercress	10 pieces	25	..	8
Egg	1	50	7	73
Mineral oil, mayonnaise, or French dressing				
Sliced orange	1	100	..	48
Skimmed milk or buttermilk	1 av. glass	180	6	65
Black coffee without sugar or cream, if desired		..	..	..
		..	24.5	340

Total Protein approx. 74 grams. Total Calories, 1004.

Saccharin is substituted for sugar. At times fifteen grams of glycerine is used instead of all saccharin. In such cases, estimate 33 to 40% of the glycerine used as glucose.

Reduction Diet

Weight of patient ....kilo........
Height .... inches
Age of patient ....
Protein per kilo ....
Total calories ....

Rx. Prot. 68 gms., Fat 40 gms., Coh. 92 gms. Total Calories 1000

Example

Normal Average

Weight of patient....................68 kilo.
Height 5 ft. 7 inches
Present weight ....90 kilo.
Overweight ....22 kilo.
Or approx. 32½% overweight

Type of Food	*Amt. Gm.*	*C. Gm.*	*P. Gm.*	*F. Gm.*	*Cal.*
Vegetables, 3%	300	9	3	..	48
Vegetables, 5%	200	10	2	..	48
Vegetables, 10%	50	15	1	..	24
Fruit, 10%	300	30	..	..	100
Buttermilk	360	17	11	2	130
Bread	30	16	3	..	76
Cottage Cheese	75	3	16	1	85
Butter	15	..	..	13	127
Meat (beefsteak)	75	..	16	15	199
Egg	50	..	7	5	73
Gelatin	7	..	7	..	28
Cream, 20%	30	1	1	5	112

Breakfast:

Grapefruit, ½ small (without sugar).

1 egg.

½ slice of bread (or 1 slice and omit bread at second meal).

Butter, 1 tsp.

Coffee (without cream or sugar), use saccharin.

Dinner:

Broiled beefsteak, 2 pieces $2\frac{1}{4}'' \times 2\frac{1}{2}'' \times 1''$, butter 1 tsp.
String beans, ½ cupful
Asparagus, 8 stalks
Lettuce, 5 leaves
Tomato salad, 1 medium, and
Cucumber, 10 slices
Mineral oil mayonnaise, 1 T.
Orange gelatin, 1 mold (½ c.)
Cream (20%), 1 T.
Buttermilk, ¾ glass

Supper:

Cottage cheese salad
  Lettuce, 3 leaves
  Celery, 2 stalks
  Cottage cheese, 5 T.
  Mineral oil, mayonnaise, as desired
Baked potato, 1 small (or ½ medium)
Butter, 1 tsp.
Coffee, jelly, with 1 T. 20% cream (no sugar, use saccharin)
¾ glass of buttermilk

If meat is desired at supper, use only 1 piece of beefsteak at dinner, and add 1 medium (lean) lamb chop at supper.[1]

The rules for making jelly may be found on pages 133-134, this text.

Milk Diet

If a very rigid reduction regime is necessary physicians at times use a "Milk" diet. This is very low in calories

[1] If a higher calorie intake is desired (1200) meat or fish may be added to the evening meal, or 2 eggs, instead of 1 egg for breakfast, and 1 slice of bacon (well drained) and a glass (180 c.c.) orange juice.

because from 1 quart to a quart and a half of whole milk is used per day. This milk is divided into 4 to 6 glasses per day. It is necessary to keep the patient more or less quiet on so low an intake of food, on account of the accompanying weakness, which is often complained of when the quantity of food is so appreciably lowered.

The milk diet is modified in the following manner:

Modified Milk Diet

Milk, 1 glassful 240 c.c. 8 A.M., 12 M., 4 P.M. and 6 P.M. This gives an intake of 32 grams of protein and 666 calories (approx.).

To this is added 6 Uneeda crackers, which will add 4 grams of protein and 136 calories to the total food intake, or 36 grams of protein (which is sufficient to maintain nitrogen equilibrium) and 802 calories.

If a more liberal allowance of calories is desired at the same time, an added precaution against constipation, ¾ glass (180 c.c.) orange juice may be added to morning feeding (give orange juice ½ hour before the cracker and milk feeding). The addition of 180 c.c. orange juice will furnish 86 calories.

OBESITY MENUS

Lunch:

Tuna fish salad
Cauliflower
Baked apple

Dinner:

Soft-shell crabs
Roast lamb
Spinach
Tomato jelly
Grapefruit

Lunch:
Corned beef and cabbage
Stewed pears

Dinner:
Clam cocktail
Roast chicken
Asparagus
Fruit salad

Lunch:
Broiled oysters; cold lamb
Boiled turnips
Water-cress salad

Dinner:
Roast-beef
Stewed tomatoes
String beans
Lettuce and tomato salad
Sliced peaches

Lunch:
Broiled calves' liver
Greens (mustard, turnip, beet tops, or dandelion)
Orange jelly

Dinner:
Crab-flake cocktail
Broiled squab
Artichokes
Stewed celery
Lettuce, Russian dressing

Lunch:
Kippered herring
Veal croquettes (baked instead of fried, with tomato sauce; this dressing is made by adding 1 teaspoonful

of chili sauce to the regular dressing used in obesity diets)

Asparagus

Apple sauce

Baked halibut steak, stuffed with oysters

Boiled onions

Boiled carrots

Pineapple and grapefruit salad

Breakfasts accompanying these menus are made up of:

1 serving of fruit

1 slice toast, lightly buttered

1 soft cooked egg

Cup of coffee without cream or sugar

CHAPTER XXIII

GOUT, ARTHRITIS, EMACIATION

GOUT is a constitutional disease characterized by an inflammatory condition of the joints. It is caused by or associated with a retention of uric acid in the blood. Gout is also characterized by the deposit of uric acid or sodium salts which occurs in different parts of the body, the joints, the lobe of the ear, the knee and the elbow being common points where the deposit of these salts ordinarily occurs. The amount of uric acid is lessened in the urine in cases of true gout, except in acute attacks, and in this way it is distinguished from the so-called goutiness in which a urinalysis shows an excess of uric acid. According to Strouse, this excess of uric acid in the urine "means a physical-chemical change in the urine and is quite different from the small amount usually excreted." [1]

Source of Uric Acid.—In man the uric acid which is eliminated in the urine is derived from two sources. It may be taken with the body as purins in food, in which case it is spoken of as being an "exogenous" product, or it may be formed in the body from the breaking down of the nucleoproteins (the highly nucleated cells of the glandular organs particularly). When the uric acid is formed in this manner as the result of the metabolism of the body tissues, it is known as "endogenous." In the normal body approximately one-half of the uric acid formed is oxidized, while the remaining half is eliminated from the body by way of the urine.

Elimination of Uric Acid.—In gout such is not the case, the body loses to a certain extent the ability to elimi-

[1] "Food for the Sick," p. 97, by Strouse and Perry.

nate the uric acid, hence it is retained within the body, causing an excess in the blood stream, and it is this excess uric acid in the blood which causes the acute attacks and general pain and discomfort which inevitably occur in chronic gout.

Purin-bearing Foods as Sources of Uric Acid. — Formerly no difference was made in food; all were supposed to cause uric acid formation, but with the exhaustive investigation of food materials this sweeping condemnation has been to a great extent removed or narrowed down to a few foods, those rich in purins being the chief offenders.

Chief Causes of Gout. — Without a doubt, overeating, overindulgence in alcoholic stimulation, lack of exercise, etc., are chiefly to blame for the large percentage of the cases, but upon investigation it will be seen that those individuals are as a rule large protein eaters and that their mode of living is not such as to assist the body in throwing off the poisons which form as the result of their self-indulgence.

Rules to Combat Gout. — To successfully combat the retention of a large percentage of uric acid in the blood there are certain definite rules to be observed: (1) The general diet must be reduced not only in amount but also in purin-bearing foods; (2) All foods which are liable to cause digestional disturbances, with the attending evils of intestinal putrefaction and constipation, must be avoided.

Alcohol in Gout. — If the patient is accustomed to alcoholic stimulants and has been in the habit of taking them constantly for years, the amount of alcohol consumed daily must be radically reduced and only the amount prescribed by the physician taken. Alcohol without a doubt assists in the retention and increases the difficulty of uric acid elimination by the body. In view of the present knowledge of the cause and effect of uric acid in the body, the treatment of gout is directed with the object of relieving the condition (1) by facilitating the elimination of uric

acid from the body, and (2) by so regulating the diet as to exclude as far as possible those purin-bearing foods which, by reason of their chemical composition, augment the general amount of uric acid formed within the organism.

In gout, as in other abnormal conditions, no set rule can be laid down to cover the treatment of every case. The individual must be taken into consideration, his daily habits studied and the extent and character of the disease known before it is possible to prescribe a treatment or formulate a diet which would adequately meet his needs under the existing conditions.

Obesity and Glycosuria. — Gouty individuals often become obese and show evidences of glycosuria. Consequently it is important to regulate the carbohydrates as well as the purin-bearing foods in the diet. Only the simplest foods are permissible. In acute attacks it has been found that milk and alcohol cause less disturbance than meat and alcohol. While the acute symptoms exist all meat should be avoided and the daily allowance of alcohol cut down. Tea and coffee both contain purins and should be avoided while the acute stage of the disease continues. Cereal coffee, hot water, tea or hot milk or buttermilk may be substituted.

Purin-free Diet. — A purin-free diet is advisable during the acute attack. The following is a sample menu of such a diet:

Breakfast — Banana, apple, grapefruit, orange or peach, etc.
Cereals: farina, hominy, or cream of wheat with cream and sugar
1 egg, soft cooked
Buttered toast
Cereal coffee with sugar and cream or hot-water tea (milk and hot water) with cream and sugar

Lunch or Dinner — Poached egg on toast, 1 large baked potato with butter, 1 mold of fruit jelly with cream

Supper — Rice and butter, bread or toast with hot milk

Apple sauce with cream

		Purin Per Cent.
Cocoa	contains . . .	1.00 per pint
Tea	" . . .	1.20 per pint
Coffee	" . . .	1.70 per pint

Purins are soluble in water, hence those foods that are boiled contain less than those prepared by other methods of cookery.

Foods More or Less Condemned. — Salt has a tendency to bring about a deposit of sodium urates in the body, and for this reason should be sparingly used in the preparation of the diet. Alkaline waters are inclined to produce a like result, consequently should be avoided by the gouty individual. Condiments and spices are conducive to constipation, a condition to be avoided if possible under the circumstances. Certain physicians prohibit the use of oranges in the diet of gout, while others do not. Strawberries are likewise condemned and should be eliminated from the diet for both chronic and acute gout.

Diet in Chronic Gout. — In chronic gout it is necessary to maintain the general health of the patient by a well-balanced diet. This is not difficult even if the dietary is so regulated as to be well within the limits of his energy requirements. It is necessary to limit the purin-bearing foods. Meats are used sparingly and these should be boiled rather than roasted or broiled. Eggs and cheese and milk should be substituted for at least part of the regular allowance of meat.

Exercise and Massage. — The patient should be recommended to take a certain amount of mild exercise in the

open air, or massage if he is accustomed to living an indoor life or is confined to office work. He must be warned against overindulgences of all kinds, especially of overeating and drinking. A glass or two of hot water before breakfast is recommended.

Treatment of Obesity. — The treatment of obesity when occurring in gouty patients is much like that used in other conditions. Ebstein regards obesity under such circumstances as an unfavorable symptom. He advises a reduction in the carbohydrates to the smallest possible amount and allows meat and fats in the diet.

Allowable Foods. — The following foods are practically purin-free and may be used in the diet of gout:[2] Milk, cheese, butter, eggs, nuts, gelatin, fruits, sugar, breads made with white flour, cereals, cream of wheat, farina, rice, hominy, tapioca, cornstarch, potatoes and other root vegetables, green vegetables, except asparagus, spinach, and all fats.

Avoidable Foods. — The following foods are rich in purins and should be avoided in the diet for gout: Sweetbreads, liver, kidneys, beef, mutton, veal, pork, turkey, chicken, goose, rabbit, duck and other game, fish, with the exception of cod, sardines, and anchovies, tea, coffee, and cocoa.

The following list shows the purin content of some of the above-mentioned foods. The purins are computed by Hall as follows: 1 kilogram contains,

	Grams Purin		*Grams Purin*
Milk		Flour	
Butter		Bread	
Eggs		Cauliflower	
Cheese		Eggplant	
Farina		Cabbage	
Rice		Lettuce	
Hominy		Sugar	
Potato	0.02	Peas	0.39

[2] The amount of food must be limited, since overeating will precipitate an acute attack. It is best to limit the amount to about a maintenance allowance or a little more, temporarily.

	Grams Purin
Asparagus	0.21
Lentils	0.38
Halibut	1.00
Cod	.05
Salmon	1.00
Mutton	0.96
Beef	1.10-2.00
Veal	1.10
Ham	1.10
Pork	1.20
Oatmeal	0.53
Beans	0.63
Chicken	1.20
Sherry	
Claret	
Whisky	
Brandy	
Beer	0.12
Porter	0.14
Ale	0.14
Chocolate	0.70 per pint

To keep the body in good condition and to help rid it of accumulated poisons, the following diet lists are recommended:

Purin-Free Diets:

7 A.M.—Hot water, 8 oz.
8 A.M.

Breakfast—Stewed prunes, wheatena and cream
2 eggs
2 slices of buttered toast
1 cup of milk flavored with cocoa or coffee or 1 cup of cereal coffee with cream

Dinner—Cream of pea soup
Fruit salad
Mashed potatoes
Cauliflower
Rice pudding

Supper—Cream toast
Baked potatoes
Egg nest
Apple sauce
Hot milk flavored with coffee, cocoa, or 1 cup of cereal coffee

7 A.M.—Hot water, 8 oz.

8 A.M.

Breakfast—Grapefruit
Cream of wheat and cream
Soft scrambled eggs
Cereal coffee, or milk and coffee
Buttered toast

12:30

Lunch—Cream of tomato soup
Cottage cheese and cream
Baked potato
Baked apple
White bread and butter

6 P.M.

Dinner—Cream of corn soup
Candied sweet potatoes
Baked eggplant
Lettuce salad (lemon juice instead of vinegar)
Bread and butter
Orange or wine jelly
Milk

Breakfast—Cornflakes and cream
Baked apple with cream
1 slice of bacon
1 soft-cooked egg
Toast—butter
Cereal coffee, or milk flavored with coffee

Lunch—Vegetable soup
Scalloped potatoes
Cream cheese
Bread, butter
Stewed pears

Dinner—Macaroni and cheese
Cream potatoes
String beans
Fruit salad
Sponge cake, orange sauce
Postum or Kaffee Hag

ARTHRITIS

In the majority of cases of arthritis it is customary to arrange a dietary in which the requirements of the patient are covered, but one not in excess of the body needs. The meals are balanced carefully and planned to overcome constipation which is frequently present.

When arthritis is complicated with liver or gall bladder disturbances, the fats are necessarily kept low, and the sweets are decidedly restricted.

Green vegetables and fruits from 600 to 800 grams combined are used to combat constipation.

Care must be observed to include ample iron, and vitamins.

The patient should be warned against the old fallacy regarding so-called red meats, in the treatment of arthritis. In this condition the tendency to develop anemia is apparent and the addition of meat not only gives the building and maintenance material in concentrated form, but it also adds variety to the diet, an asset when the appetite is as capricious as it frequently proves to be with arthritic patients.

EMACIATION

Emaciation as a rule is a symptom of an abnormal condition rather than a disease in itself. Certain individuals are said to be "constitutionally thin" and upon investigation it is often found that this thinness extends back in many cases for generations, many members of a family

being thin no matter what measures are taken to overcome the condition. However, constitutional emaciation is not so prevalent as constitutional obesity and, as has already been stated, is more often a symptom of some metabolic disturbance or pathological condition.

Causes of Emaciation.—**Errors in diet**—insufficient or improper food—are accountable for most of the cases seen in infants and children. **Over-exercise**, that is, when the amount of exercise taken is not commensurate with the intake of food, is accountable for other cases. This type of emaciation is found especially in growing children.

Diseases as a Cause.—Wasting diseases, such as tuberculosis and anemia, bring about a loss of weight, while in fevers in general and typhoid fever especially not only the febrile condition hastens the metabolic processes but also the activities of the bacteria act together and break down the tissues of the body, causing a falling off from the normal body weight. Loss of sleep, unhygienic or unsanitary surroundings, and capricious appetites probably cause some of the cases of excessive thinness.

Thinness in Children.—Parents are to blame for much of the thinness seen in children, especially the nervous high-strung children whose energies outweigh their desire for food or, as is more often the case, their willingness to eat the proper foods. It is a mistaken kindness to cater to the whims and fancies of a child's appetite, and much harm is wrought by allowing the "trash" to overbalance the necessary building or repair food in the dietary. Not that sugar is not necessary, for it is particularly so at the age when the metabolic processes are faster than later in life, but it must be remembered that the body is being built up both in height and breadth.

The Need for Building Foods.—The skeleton and the muscular tissues cannot be constructed from sugar,

hence the diet which consists chiefly of this food constituent is unbalanced and will sooner or later bring about disturbances which are very apt to result in emaciation. **The causes of emaciation** may be summarized as follows:

(1) Those cases which are due to pathological conditions such as tuberculosis, anemia, typhoid fever, etc.;

(2) Those induced by errors in diet and bad habits such as insufficient or improper food, loss of sleep, over-exercise, lack of ventilation in the sleeping apartment, which destroys the appetite;

(3) Malformation or deformities of mouth, throat, or stomach which make it impossible for the individual to partake of sufficient food to cover the needs of the body;

(4) Heredity ("constitutional thinness").

Regulating the Diet.—As has been stated in a former chapter, any persistent loss of weight or failure to gain on the part of an infant whose chief business in life should be to grow, should be given immediate and careful attention. As a rule the diet is to blame; it is either improperly balanced, insufficient in amount, or poorly prepared, any of which might readily cause a disturbance to the delicate apparatus of the child.

Diet and Habits.—In adults, the diet and habits of life are in many cases to blame for the excessive thinness seen in many individuals. If the trouble can be traced to some abnormal condition, it can only be removed by relieving or checking the disease which induced it. The older methods of treating typhoid fever, for example, did nothing to prevent the progressive emaciation which was the result not only of the accelerated metabolism from the fever but also from the invasion of the intestinal tract by the specific bacteria which brought about a like result. In tuberculosis

a similar breaking down of the tissues occurs, as is likewise the case in anemia and other diseases in which the functions of the blood-making organs are interfered with. Any of the above diseases may cause emaciation, and the treatment in most of the cases resolves itself in removing the cause as far as possible and in adjusting the diet.

Selection of Food.—The dietetic treatment for emaciation is practically the only one which will materially change the weight of the individual, since by food alone is the body built. Certain foods are more capable of being readily converted into adipose tissue than others, and these must have a prominent place in the dietary.

Rules and Regulations.—In obesity it was found that it was necessary to curtail the sleep and rest, increase the amount of exercise and decrease the amount of food. In emaciation practically an opposite régime is adopted. The patient is urged to eat plenteously, drink copiously of water and nutrient beverages, soup, etc., avoid worry and excitement, over-exertion and indigestion, to take one or two naps every day, to retire early, to avoid hot baths and take a warm cleansing bath followed by a cold shower or sponge bath. Exercise must be of a mild character; the patient must be warned against becoming exhausted, since this condition precludes a gain in weight.

Dietetic Treatment.—The meals must be carefully selected, well prepared and daintily served, that all of the psychical benefits from such efforts may be attained. A nutrient beverage such as cream, egg, and vichy, reënforced fruit beverages, malted milk, with egg and chocolate, cereal and milk gruels, etc., may be given between breakfast and lunch, lunch and dinner and before retiring. The meals must consist of the simplest foods that the digestion may not be overtaxed by the quantity ingested.

Allowable Foods.—The following foods may be used

in the treatment of emaciation: All dairy products, milk, acidoliphus milk, buttermilk, cream, butter and cheese, eggs cooked in various ways, soups of all kinds, meats in moderation, vegetables, especially potatoes, olive oil, and the various salad oils, cereals, tapioca, macaroni, spaghetti, noodles, rice, bread of every description, fruit including bananas, grapes, dates, raisins, prunes, etc., ice creams, farinaceous puddings, sauces, except those containing vinegar, grape juice and other fruit juices sweetened with sugar, cocoa and chocolate, malted milk and proprietary infant foods, honey, molasses and sirups, cakes, cookies and pastry in moderation. It is advisable to make milk the chief fluid food; to this is added cream, malted milk, Mellin's Food, Casec, Klim (in powder form and in wafers), lactose, eggs, and other reënforcing agents.

Milk Cure.—Certain physicians advise milk alone, giving from one to two gallons a day for three weeks or longer. Many individuals complain that "milk makes them bilious" but, as a rule, this is because the amount taken in small and the solids insufficient to lend the necessary bulk to the feces, consequently the peristaltic action becomes sluggish and the passage of the food mass delayed in the intestinal tract, furnishing a medium for bacterial growth and activity. When larger quantities are ingested such is not the case and the fluid so high in nutrient qualities is utilized by the body for the building up of the depleted tissues. When the emaciation is the result of disease the diet is necessarily adjusted to meet the condition. At times it is most difficult to overcome the anemia and accompanying emaciation on account of the disease precluding the giving of the foods especially designed by nature to produce flesh. This is especially the case in the progressive emaciation in diabetes. However, in this case the present method of giving a maintenance diet and insulin to make available the excess

carbohydrate has gone far toward overcoming this distressing condition.

Readjusting the Habits.—When the loss of weight is found to be the result of close application to work, lack of fresh air and sleep, or from errors in diet, a change of climate and occupation should be made, together with a readjustment of the daily habits, such as substituting a cool bath for the regular hot one, and sleeping out of doors or on a sleeping porch instead of in a poorly ventilated bedroom.

The patient must be urged to eat, regardless of appetite, for in this way only can the body weight be increased. The dietary must be made up largely of the fat-forming foods, but not to such an extent as to upset the nitrogen equilibrium.

The following diet sheet is given to be used as a guide in the treatment of emaciation. Other foods of a similar composition and fuel value may be substituted for those given here, to vary the diet.

EMACIATION DIET SHEET

Approximately 5106 calories

Material	*Amount*	*Protein Gm.*	*Carbohydrate Gm.*	*Fat Gm.*	*Total Calories*
Breakfast:					
Stewed prunes	6 prunes	1.02	35.26		145.
Sugar	1 tbs.		14.7		56.6
Oatmeal with cream and sugar	1 tbs. (dry) 2 tbs. cream 1 tbs. sugar	3.2	25.0	6.6	172.2
Poached egg	1 egg	5.35		4.16	58.8
Toast Butter	3 slices 1 tbs.	7.9	44.7	13.0	328.
Coffee with cream and sugar	1 cup 1 tbs. cream 2 tsp.	.40	.40 9.45	2.8	53.9
Milk and cream	$\frac{2}{3}$ cup milk $\frac{1}{3}$ cup cream				389

Emaciation Diet Sheet — *Continued*

Material	*Amount*	*Protein Gm.*	*Carbohydrate Gm.*	*Fat Gm.*	*Total Calories*
11 A.M.					
Cereal milk gruel	8 oz. (1 cup)				248.
with cream	1 ounce				
Lunch, 1 P.M.:					
Cream of pea soup	8 oz. (1 cup)	6.	17.65	7.66	185.9
Potato salad	3.5 oz. (1 serving)	1.75	15.5	15.33	210.
Bread	3 slices	7.8	44.7	1.04	328.
Butter	1 tbs.	.8	1.4	5.6	
Cocoa made with milk	1 cup				
Sugar	2 tsp.	27.	27.6	41.4	661.
Milk	⅔ cup				
Cream	⅓ cup				329.
3:30 P.M.					
Cream, egg, vichy	8 oz.	4.9	12.4	36.	393.
Dinner:					
Tomato bouillon	1 cup				38.
with whipped cream	1 tbs.	.30	.42	5.67	53.9
Beefsteak	1 serving (3 oz.)	18.6		17.34	230.5
Mashed potatoes	⅓ cup	1.16	7.5	3.5	66.5
Cauliflower	1 serving	1.53	2.99	.42	21.8
Asparagus salad	6 stalks	2.00	3.72	.24	111.8
with mayonnaise	2 tsp.	.01	1.45	9.00	
Bread	2 slices	5.2	29.8	.68	419.
Butter	2 tbs.	.28		24.09	
Charlotte russe	1 serving	2.3	11.1	22.6	257.
Milk	⅔ cup				389.
and cream	⅓ cup				
Black coffee if desired	½ cup				
At bed time:					
Malted milk made with milk	1 cup	8.4	41.	10.2	288.5
and reënforced with lactose	1 ounce				

Methods of Increasing the Diet.—The above diet furnishes three times as much food as is needed to maintain the body living a sedentary life, or about as much as would be needed to maintain a lumberman at hard outdoor labor in the Maine woods. It would be impossible for an ordinary individual to handle such an abundant diet without making the increase in the diet gradually. This is best done by adding the milk and cream at the end of each meal and a glass of milk between meals and at bedtime, then gradually adding the fattening foods already mentioned until the diet approximates the diet sheet here computed.

SUMMARY

GOUT

Gout is a constitutional disease characterized by an inflammatory condition of the joints.

The Joints are the seat of chalky deposits of uric acid or sodium salts.

Metabolism in gout is disturbed, with a consequent retention instead of elimination of uric acid by the body.

The Blood contains an excess of uric acid which increases greatly during an acute attack.

The Urine in true gout does not contain an excess of uric acid except during an acute attack, whereas in the so-called goutiness there is a constant excess of this acid.

Uric Acid is produced as the result of the metabolism in the human body of the nucleoproteins and in food of the purin bodies.

Alcohol undoubtedly assists in the retention and increases the difficulty of uric acid elimination by the body.

Chief Causes of Gout.—Overeating, excessive alcoholism, and too little exercise, especially in the open air.

Treatment consists in regulating the diet both as to the quantity and type of food eaten; reducing or eliminating

the alcohol in the dietary, and increasing the amount of outdoor exercise.

Dietetic Treatment.—The best results are obtained by reducing the size of the meals and avoiding the purin-bearing foods as far as possible. Eggs are purin-free and may be substituted for much of the meat in the diet. In chronic gout it is impossible to eliminate meat entirely from the diet, but the quantity can be materially reduced and that which is eaten may be rendered less harmful if it is boiled instead of roasted or broiled, as in this way much of the purin is dissolved out. Highly spiced and seasoned foods, rich gravies, etc., are apt to cause an acute attack and should be omitted. Excesses of all kinds must be avoided to enable the patient to live a fairly comfortable life, free from frequent painful attacks of gout.

EMACIATION

Causes.—Errors in diet, overwork, over-exercise, heredity, nervousness, worry, malformation of the mouth, throat, or stomach, heredity and certain pathological conditions, such as typhoid fever, tuberculosis, anemia dysentery, etc., in which the breaking down of the tissues occurs more rapidly than they can be rebuilt.

Children are often emaciated on account of their unbalanced diet. They receive an insufficient amount of building food to cover their growth and development requirements. Parents are often to blame for allowing the child to overeat of some of the food constituents at the expense of others. Sugar, for example, is very necessary in the diet of a growing active child, but all sugar and very little milk and eggs will lead to an unbalanced diet which may bring about a condition of extreme thinness later on.

In Adults the constant eating of the wrong foods, overworking and persistent worrying, all contribute to the breaking down of the tissues which ends in emaciation.

Weight is an index to health. Any persistent loss of weight on the part of an adult or loss or even failure to gain in a growing child, are indications that all is not right and immediate measures must be taken to locate and relieve the trouble.

Loss of Weight due to pathological conditions can only be relieved by removing the cause, after which the diet may be adjusted to suit the condition.

Dietetic Treatment is practically the only means of combating and overcoming emaciation, since it is by food alone that the body is built.

Fat-forming foods, which in obesity were prohibited, have a prominent place in the diet for emaciation. Padding the nerves and organs with a layer or covering of fat protects them from the jars and shocks incidental to daily life, besides lending grace and contour to the body.

Foods Which Produce Fat are nutrient beverages of all sorts; milk, malted milk and cream are especially valuable; water, because of its particular properties and functions in the body; and fruit beverages, which are made chiefly of water and sugar, are always included in the dietary. Milk and cream, soups and milk gruels, as well as all dishes made with milk or cream, add materially to the fat-forming quality of the diet. Butter, olive and other salad oils, as well as cereals, potatoes, bread and simple desserts are advised. The diet must be bountiful, the meals frequent, and lunches consisting of milk or cream with crackers will hasten the gain in weight.

Rest, preferably lying down, is absolutely essential. A period of relaxation covering from fifteen to thirty minutes should be taken before or after each meal. The body derives the use of the food for the storage of fat which would otherwise be required to cover its energy expenditures.

Sleep is essential to gain, consequently the patient should retire early and take one or two naps during the day.

Baths should be warm, not hot, followed by a cold shower or sponge.

Exercise must be mild in character; over-exertion precludes a gain in weight and exhaustion undermines the forces which make it possible for the body to store fat as adipose tissue.

Nervous Excitement and Worry must be avoided.

Gastro-intestinal Disturbances should be guarded against, since all the pounds gained through months of treatment may be quickly lost during one acute attack of diarrhea or auto-intoxication.

Massage is advised. The kneading and gentle manipulation of the muscles stimulates them to utilize more food material, besides enabling the patient to eat more by reason of an increased appetite.

The Milk Cure has been used extensively in overcoming extreme emaciation. It consists in the taking of large quantities, ranging from one to two gallons per day. It is given every hour or oftener for a period of one month to six weeks.

Reënforcing the Diet with eggs and lactose is often found of great value in increasing the weight quickly, as is the giving of one-third of a glass of cream and two-thirds of a glass of milk after each meal and at bedtime. The whole scheme of putting on pounds resolves itself into the giving of proper food in larger quantities than are ordinarily given, but dividing it up into frequent meals in order not to upset the digestion and do away with the good already accomplished.

PROBLEMS

(*a*) Formulate a diet order for a patient with gout in which the purin foods are eliminated.

(*b*) List the foods of special value in the diet for emaciation. Write a diet order for day suitable for a patient (woman) weighing 110 pounds, whose normal weight is 135 pounds.

CHAPTER XXIV

OTHER CONDITIONS MORE OR LESS AFFECTED BY DIET

ACIDOSIS, EPILEPSY, PELLAGRA AND PERNICIOUS ANEMIA

ACIDOSIS

THERE is seemingly much confusion regarding the nature of acidosis. Some have the erroneous idea that it means an acidity of the blood. Such a condition, of course, would be incompatable with life.

The term is used to indicate the presence in the blood of certain acids in toxic amounts in the neutralization of which the normal alkalinity of the blood is greatly reduced.

Hence, it is not an acidity of the blood, but a depletion of the body's reserve store of essential alkali that gives rise to the symptoms known as acidosis. On the contrary, when, as sometimes happens, these alkalies are greatly increased above the normal we have a condition known as alkalosis, because of certain symptoms in common this condition is occasionally confused with acidosis.

Definition.—Woodyatt [1] defines acidosis as "A condition in which the concentration of bicarbonate in the blood is reduced below the normal level." Thus it makes no difference from what source or sources this demand comes so long as it is sufficiently great to deplete the alkaline reserve in the body.

The Chief factors concerned in the lowering of the alkali level in the body are: decreased alkali supply, and an increased acid formation which demands alkali for neutrali-

[1] R. T. Woodyatt, "Acidosis"; Nelson's Loose Leaf Living Medicine, Vol. III.

zation. Probably, the high protein diets which are as a rule deficient in alkaline bases; increasied elimination of alkali by way of the bowels, causing an intoxication in infants (see page 237); failure of the kidneys to eliminate the acids formed in nephritis may all be held accountable for the lowering of the normal alkali level in the body.

Specific Causes.—There are a number of conditions in which acidosis may occur;—severe diabetes; acute nephritis, uremia, chronic diffuse nephritis, infections (streptococcus infections, boils, erysipelas, etc.), prolonged vomiting, diarrhea; starvation, fevers, spastic and obstructive constipation which may lead to an absorption of certain toxic substances formed as a result of the putrefactive bacteria upon the unabsorbed protein in the lower part of the small intestine or colon. Acidosis occurs likewise in certain obese patients, and in those suffering from hysteria, in the latter case it is generally caused by an inability on the part of the individual to retain the proper amount or type of food.

Prevention and Relief.—The keynote of the treatment for acidosis lies in the restoration of the normal supply of alkaline bases, this may be accomplished in the following ways: (1) by increasing the carbohydrates especially those furnishing a maximum amount of alkaline bases, such as fruits, green vegetables and potatoes, (2) reducing the acid forming foods in the diet, such as meats, eggs, cereals and breadstuffs (allowing merely enough of such foods to give variety to the diet and which may be balanced by a proper intake of alkaline or base forming foods); (3) prevention or overcoming constipation, (4) by giving of glucose or glucose and bicarbonate of soda by mouth, subcutaneously, or intravenously; (5) by the use of alkalies, such as bicarbonate of soda; (6) by the introduction of insulin. The three last mentioned measures are considered in the light of emergency measures and are in the hands of the physician entirely, no nurse can presume to say when, or under

what circumstances it is best to give the patient bicarbonate of soda in large doses, or to inject insulin for the relief of the acid intoxication.

Dietary Management.—The dietary management of acidosis in diabetes is fully covered in the chapter on diabetes. For the restoration of the alkali reserve in the body under other circumstances it is advisable to use fruits and fruit juices (except prunes and cranberries; these fruits are high in bases but contain certain substances which form hippuric acid in the body and increase the acidity of the urine). Orange juice is the best of the fruit juices from a base forming standpoint, but pineapple juice, lemons, and grapefruit juice are all efficient in restoring the alkali level in the body. The stress laid upon the juices instead of the whole fruit is on account of the ease of introducing liquids into the body of very ill patients. Other efficient alkaline or basic fruits may be found on page 417; Green vegetables, potatoes, dried beans and peas, soy beans (the flour and meal made into muffins) should furnish the bulk of the daily menu except when the patient is on a liquid diet. Milk has not been mentioned before, but it is considered to be indispensable in many of the conditions mentioned as being ones in which acidosis occurs. It may be necessary to make use of one of the fat low milks, such as skimmed milk, fat-free lactic acid milk; protein or acidoliphus milk, in any of which dextrimaltose, dextrose, or glucose (Karo syrup) may be added to increase the base forming properties and add to its calorie value.

With infants and small children the following routine treatment is suggested: In extreme cases where there is vomiting, 15 to 30 c.c. of a 6 per cent glucose solution is given by mouth every half hour until vomiting ceases, after which the intervals between doses are lengthened and the amount given at each feeding is increased to from two to three ounces (60 to 90 c.c.). When orange juice (or pine-

apple juice is used in place of the glucose solution the half hour intervals are observed in the beginning, the amount at each feeding beginning with 15 c.c. and gradually increased to 30 or even 60 c.c. as the length of the intervals increase.

In extreme cases it is sometimes necessary to give the glucose other than by mouth, in these cases it is customary to use a solution made from glucose and distilled water.

Glucose by Enema.—500 c.c. of 5 per cent glucose with 2 per cent bicarbonate of soda is given by the drip (Murphy Drip) method every 4 to 6 hours.

Glucose Subcutaneously.—500 c.c. of a 3 per cent glucose solution is given subcutaneously every 4 to 6 hours.

Glucose Intravenously.—A 10 per cent solution of glucose (only the very purest glucose obtainable is used under such circumstances) made with triply distilled water, the physician indicates the amount to be given and the number of doses to be given.

The following menus high in base or alkali producing foods are added to show the way in which the body alkali reserve may be restored. It is well to call attention to the tables on pages 416-417 showing the alkali and the acid forming foods as well as the neutral foods that are used to fill out the menu and to furnish the necessary calories for maintenance. The soy bean muffins mentioned in these diets have been found experimentally to be very efficient in supplying the necessary alkali in the diet.

Breakfast:

Fresh strawberries and cream
Soy bean muffins
1 glass orange juice
Butter
Bacon
1 glass milk
Marmalade

Dinner:

Cream of tomato soup
Broiled mushrooms
Fresh apple with cheese salad
Mashed potatoes
Soy bean muffins with butter
Brussels sprouts
Orange gelatin
Glass of milk

Supper:

Cream of celery soup
Scalloped potatoes
Boiled onions
Soy bean muffins
Buttered beets
Cottage cheese salad
Butter
Sliced peaches
Glass of orange juice
Cocoa or buttermilk

Breakfast:

Baked apple
Soy bean muffins
Butter
Glass orange juice
Bacon (2 strips well drained)
Raspberry jam
Cup of cocoa or milk

Dinner:

Cream of onion soup
Cauliflower
Soy bean muffins
Creamed potatoes
String beans

Asparagus salad
Butter
Apricot ice
Glass orange juice
Glass buttermilk

Supper:

Cream of pea soup
Baked potato
Creamed cabbage
Waldorf salad
Orange juice
Soy bean muffins
Milk or cocoa
Butter
Cornstarch pudding with raisins

KETOGENIC DIET IN THE TREATMENT OF EPILEPSY [2]

The treatment of epilepsy by diet has only been in vogue for a few years, but during this time many cases have been so treated and in the majority a decided improvement has been brought about. The diet is ketogenic in character, that is the ketogenic substances, acetone and diacetic acid, predominate over the antiketogenic substances (glucose) to an extent to render the patient in a state of ketosis.

The object of the diet is to produce ketosis as rapidly as possible without upsetting the digestion of the child.

We know that ketosis is produced whenever there is an incomplete combustion of the fats, and that this occurs when there is not sufficient carbohydrates available to burn the fats in the diet. As long as there is 1 gram of carbohydrate available for 4 grams of fat, the fats will be burned to their normal end products, carbon dioxide and water; but when for any reason the carbohydrates fall below this ratio (1:4), the fats are not completely burned and acetone and

[2] Courtesy of Drs. Wilder and Helmholtz, Mayo Clinic, Rochester, Minn.

diacetic acid will appear in the blood. All of the carbohydrates and approximately 60 per cent of the proteins are available for the production of glucose in the body, consequently a diet to produce ketosis must be low in carbohydrates and protein and correspondingly high in fats.

It must be remembered that all diets for children must be so constructed as to cover the growth requirements, which means that it is necessary to give sufficient protein (the tissue building and growth producing material) to meet the demands of the growing body. In addition to the fats and carbohydrates the mineral salts and vitamins are equally important, and the water allowance as carefully adjusted in this as well as in other diets.

The value of the organic foodstuffs per gram has been discussed elsewhere. The number of calories required vary according to the age, weight, height, activity, sex and temperature, therefore it is necessary to consider each patient individually. The prescription is given by the physician, and must be filled accurately in order to get the desired results. It has been found that patients living on a normal (usually a high) carbohydrate diet will develop nausea when a diet high in fat is substituted. For this reason it has been found practical to place the patient on a diet containing 75 grams of carbohydrate the first day, reducing this to 50 grams the second day, and to 30 grams the third day. On the fourth day the prescription is given.

If nausea develops on the third day small amounts of orange juice are given and the diet is not reduced until the nausea has disappeared. Sometimes nausea and vomiting occur in the course of the treatment. A return to a more general diet for two or three days will overcome the disturbance and permit a resumption of the ketogenic diet.

The names of the foods are written in the food column, then the tables are consulted for advice as to the composition of the food chosen and the amounts of each foodstuff

are made so that the final total of protein, carbohydrate, and fat agrees with the prescription. No food is allowed except that which the diet order permits. This rule covers not only the usual foods but also chewing gum.

To Calculate Diet.—The total caloric requirements of children vary considerably and inasmuch as proportionate and not absolute amounts are essential, it is well to start with a minimal requirement, beginning with 50 calories for each kilogram of body weight and then gradually increasing, if necessary, up to from 60 to 75 calories, in order to achieve a gradual gain in weight.

To obtain the child's weight in kilograms the weight in pounds is divided by 2.2. The quotient multiplied by 50 will give the total number of calories required in twenty-four hours. Given a body weight of 85 pounds, what total calories are necessary and what amounts of carbohydrate, protein, and fat?

$85 \div 2.2 = 38.6$ or 39 kilograms. $38 \times 50 = 1950$ calories.

The minimal requirement of protein is 1 gram for each kilogram, which would be in this case 39 grams of protein. Thirty-nine grams of protein yield 156 calories.

$1950 - 156 = 1794$ calories to be made up of carbohydrate and fat. The danger of nausea and vomiting makes it essential to start with about 75 grams of carbohydrate the first day. Seventy-five grams of carbohydrate yields 300 calories.

$1794 - 300 = 1494$ calories, to be supplied by fat. If 1 gram of fat yields 9 calories, 1494 calories will be made up of 166 grams of fat. Thus the formula for the first day will be C 75, P 39, F 166.

On the second day the carbohydrate is reduced to 50 grams. The loss of 100 calories (25 times 4) is made up by adding 11 grams of fat (11 times 9) so that the prescription the second day would be C 50, P 39, F 177.

On the third day a second reduction of the carbohydrate by 20 grams would subtract (20 times 4), 80 calories which

would be made up by 9 grams of fat (9 times 9), 81 calories and the prescription would read C 30, P 39, F 186.

On the fourth day a third reduction of 10 grams of carbohydrate would withdraw 40 calories to be replaced by 4 grams of fat, leaving the prescription C 20, P 39, F 190. This prescription contains 43 grams of antiketogenic substance and 190 grams of ketogenic substances, and will probably result in a state of ketosis manifested by acetone and diacetic acid in the urine. The second day after the prescription is started the urine is tested for diacetic acid (page 395) and if present the foregoing prescription is followed. If the test is negative, the amount of carbohydrate is reduced 5 grams and an amount of fat added which will keep the total calories the same. After two days the urine is again tested for diacetic acid, and if necessary the carbohydrate reduced another 5 grams.

Increase of Total Calories.—Having in this way produced ketosis, it is necessary to weigh the patient twice a week to be sure he is not losing. If after several weighings it is seen that he is losing weight, it is well to increase the number of calories, leaving the ratio of ketogenic to antiketogenic elements the same. In making such increase, it is best not to increase the protein, but to add fat and carbohydrate in the proportion of 5:1. For instance, if an additional 200 calories is needed, add 4 grams of carbohydrate and 20 grams of fat. This would increase the diet described in the preceding paragraph to C 24, P. 39, F 210.

The patient continues on the diet and there is usually a rapid reduction in the number of the epileptiform seizures, especially if they have been of the momentary type (petit mal), and equally marked improvement in the child's irritability, mental condition, and general demeanor. It is well to continue the diet for a period of from four to six months after the child's seizures are entirely overcome. At monthly intervals the carbohydrate is increased 5 grams. Each third

month the protein is increased the same amount, reducing the fat in proportion if the child is gaining weight. The protein may be increased up to 2 grams for each kilogram of body weight.

If the convulsive seizures persist for a month to six weeks in spite of the ketosis, a period of absolute starvation of from seven to ten days can be tried. During the fast only the juice of two oranges daily is given, and the patient is urged to drink plenty of water (1 to 2 quarts). Following the starvation, the diet prescription is gradually resumed.

Cathartics and Constipation.—The frequency with which constipation coexists with epilepsy and seems to predispose to an attack makes it seem very desirable to have good elimination. The ketogenic diet is in itself somewhat laxative so that cathartics should not be necessary. If they are, the selection must be limited to the following: (1) plain granular agar-agar; (2) various mineral oils; (3) diabetic or plain petrolagar; (4) salts (Carlsbad or Epsom); (5) bitter fluid extract of cascara. Of these cathartics we have found the Carlsbad salts and sugar-free petrolagar to be most satisfactory. Either should be used to establish regularity of bowel movements only and be withdrawn as rapidly as possible.

Measures and Weights: The Metric System.—The efficacy of the treatment depends in a great measure on the accuracy of the diet planning and the careful attention given to the weighing of food.

A good set of scales is necessary. The food scales made by John Chatilon Sons, New York, and by Hansom Scale Company, Chicago, are both convenient and durable. The dial on these scales is movable. Put a dish or glass on the scale, move dial so that pointer and zero coincide, and then put food into dish until the pointer registers the required number of grams. The face of the scale reads in grams, which is a term used in the metric system. The metric sys-

tem is better adapted to this type of work than the English system of pounds and ounces.

Method Employed in Filling Diet Prescriptions.—To make the problem of working out the diets fairly simple, food is arranged in the following ten groups:

Food	*Carbohydrate*	*Protein*	*Fat*
Group 1	1.5 grams	Amount listed	Amount listed
Group 2	3.0 grams	Amount listed	Amount listed
Group 3	5.0 grams	Amount listed	Amount listed
Group 4	10.0 grams	Amount listed	Amount listed
Group 5	None	2 grams	Amount listed
Group 6	None	6 grams	Amount listed
Group 7	None	10 grams	Amount listed
Group 8	None	None	1 gram
Group 9	None	None	5 grams
Group 10	None	None	10 grams

1. Fill carbohydrate prescription from Groups 1, 2, 3 and 4.

2. Total the amount of protein supplied by the carbohydrate foods and then add foods from Groups 5, 6 and 7 to fill the protein prescription.

3. The fat may be brought up to the desired amount by foods from Groups 8, 9 and 10.

4. Vitamins, calcium, and iron content: In restricted carbohydrate diets it is rather difficult to plan menus with sufficient minerals and vitamins. Eight forms have, therefore, been arranged which give a maximum of these substances in this very restricted diet.

Because of the high fat prescription it is advisable and in most cases necessary to include cream, preferably 40 per cent cream, in every menu. Forty per cent cream is sold by the creameries as "whipping cream."

Group 1

1.5 grams carbohydrate

Vegetables	*Amount* gm.	*Protein* gm.	*Fat* gm.
Asparagus, fresh or canned	50	1.0	0
Brussels sprouts, fresh or canned	50	1.0	0
Celery	50	0.5	0
Cucumber	50	0.5	0
Endive	50	0.5	0

Vegetables	*Amount* gm.	*Protein* gm.	*Fat* gm.
Greens, beet, cooked	50	1.0	0
Green pepper	30	0	0
Kale	50	1.5	0
Lettuce	50	0.5	0
Mushrooms	50	0.5	0
Radishes	30	0.5	0
Rhubarb	50	0.5	0
Sauerkraut	50	1.0	0
Spinach, fresh or cooked	50	1.0	0
String beans, cooked or canned	50	0.5	0
Tomato, fresh or canned	50	0.5	0
Water cress	30	0	0
Dairy products			
Cream, heavy, 40 per cent	50	1.0	20.0
Cream, coffee, 20 per cent	30	1.0	6.0
Milk, whole	30	1.0	1.0
Cheddar cheese	50	13.0	16.5
Cottage cheese	37	8.0	0
Cheshire cheese	33	10.5	8.5
Nuts			
Almonds	10	2.0	5.5
Pecans	10	1.0	7.0
Brazil nuts	21	3.5	14.0
Butternuts	42	11.5	25.5
Filberts	11	1.5	7.0
Hickory nuts	13	2.0	8.5
Peanuts	6	1.5	2.5
Peanut butter	9	2.5	4.0
California walnuts	12	2.0	7.5
Black walnuts	15	4.0	8.5
Relishes			
Mustard, prepared	30	1.5	1.0
Olives, green, A.P.	17	0	3.5
Olives, ripe, A.P.	43	0.5	9.0
Pickles, cucumber unsweetened	50	0	0
Cereal products			
Curdolac breakfast food	30	2.5	1.0

All vegetables and fruits are fresh unless otherwise stated.

All vegetables and fruits are figured as edible portion unless otherwise stated.

Group 2

3 grams carbohydrate

Vegetables	*Amount* gm.	*Protein* gm.	*Fat* gm.
Artichokes, canned	60	0.5	0
Cabbage, fresh	60	1.0	0

Vegetables—Continued	*Amount* gm.	*Protein* gm.	*Fat* gm.
Cauliflower	60	1.0	0
Celery root	60	1.0	0
Egg plant	60	0.5	0
Leeks	60	0.5	0
Onions, cooked	60	0.5	0
Onions, fresh	30	0.5	0
Pumpkins, fresh or canned	60	0.5	0
String beans, fresh	60	1.0	0
Swiss chard	60	2.0	0
Fruits			
Apricots	30	0.5	0
Avocados	30	0.5	4.0
Blackberries	30	0.5	0
Cranberries	30	0	0
Gooseberries	30	0	0
Grapefruit	30	0	0
Lemons	30	0.5	0
Loganberries	30	1.0	0
Muskmelon	30	0	0
Oranges	30	0	0
Peaches	30	0	0
Pears	30	0	0
Pineapple	30	0	0
Raspberries, black	30	0.5	0
Raspberries, red	30	0.5	0
Strawberries	60	0.5	0
Watermelon	30	0	0

GROUP 3

5 grams carbohydrate

Vegetables	*Amount* gm.	*Protein* gm.	*Fat* gm.
Beets, fresh or cooked	50	1.0	0
Carrots	50	0.5	0
Dandelion greens	50	1.0	0
Kohlrabi	50	1.0	0
Oyster plant	50	0.5	0
Parsnips	50	1.0	0
Peas, green, canned	50	2.0	0
Rutabagas	50	0.5	0
Squash, fresh or canned	50	0.5	0
Turnips	50	0.5	0
Fruits			
Apples	33	0	0
Cherries	33	0.5	0
Currants	33	0.5	0
Grapes	33	0.5	0
Huckleberries	33	0	0
Plums	33	0.5	0

	Amount gm.	Protein gm.	Fat gm.
Bread			
Graham	10	1.0	0
Rye	10	1.0	0
White	10	1.0	0
Whole wheat	10	1.0	0
Dairy products			
Buttermilk	125	5.0	0
Milk, condensed, unsweetened	50	3.5	4.0
Milk, skim	100	3.0	0
Milk, whole	100	3.0	4.0

Group 4

10 grams carbohydrate

	Amount gm.	Protein gm.	Fat gm.
Vegetables			
Artichokes	67	1.5	0
Baked beans, canned	50	3.5	0
Corn, fresh and canned	50	1.5	0
Lima beans, canned	50	3.5	0
Peas, cooked	67	4.5	0
Potato, fresh and boiled	50	1.0	0.5
Fruits			
Bananas	50	0.5	0
Cereal products			
Cream of barley, dry	13	1.5	0
Cornflakes	12	1.0	0
Rolled oats, dry	15	2.5	1.0
Cream of rye, dry	14	1.5	0
Shredded wheat	13	1.5	0
Graham crackers	13	1.5	1.0
Soda crackers	13	1.5	1.0
Saltines	14	1.5	2.0
Graham bread	21	1.5	1.0
Rye bread	19	1.5	0
White bread	19	1.5	0.5
Whole wheat bread	20	2.0	0

Group 5

2 grams protein

	Amount gm.	Fat gm.
Meat products [3]		
Bacon, fat, uncooked	20	13.5
Bacon, crisp [4]	10	5.0
Eggs		
Egg yolk	1	6.0
Miscellaneous		
D'Zerta	1	0

[3] All meat is fresh unless otherwise stated.
[4] Analysis used at Mount Sinai.

Group 6

6 grams protein

Meat products	Amount	Fat
Beef	*gm.*	*gm.*
Roast	27	7.5
Steak, round, cooked	21	1.5
Tenderloin, broiled	21	4.0
Lamb		
Roast	30	4.0
Broiled chop	27	8.0
Pork		
Chop, medium fat	35	7.0
Shoulder	46	15.5
Ham, smoked, boiled	27	5.5
Sausage, homemade	46	20.5
Fish products		
Salmon, mackerel, haddock, lake trout	31	2.0
Halibut, white fish, perch, brook trout	30	1.0
Sardines, canned	26	5.0
Poultry		
Chicken broilers	28	0.5
Fowl	31	5.0
Goose	37	13.5
Turkey	28	6.5
Dairy products		
American cheese, pale	20	7.0
American cheese, red	20	8.0
Swiss cheese	21	7.0
Eggs		
Egg (one)	0	6.0

Group 7

Meats products	Amount *gm.*	Fat *gm.*
Beef, dried	33	2.0

Group 8

1 gram fat

Fats and oils	Amount *gm.*
Butter	1.0
Oleomargarine	1.0
Salad oil and cooking fat	1.0
Mayonnaise	1.0

GROUP 9
5 grams fat

Fats and oils	*Amount* *gm.*
Butter	6.0
Oleomargarine	5.0
Salad oil and cooking fat	5.0
Mayonnaise	6.0

GROUP 10
10 grams fat

Fats and oils	*Amount* *gm.*
Butter	12.0
Oleomargarine	11.0
Salad oil and cooking fat	10.0
Mayonnaise	12.0

These tables furnish sufficient variety for most diets. If more complete tables are desired consult "The chemical composition of American food materials, Bulletin No. 28, United States Department of Agriculture." This publication may be obtained by sending ten cents in coin to the Superintendent of Documents, Government Printing Office, Washington, D. C.

Fruits canned without sugar vary in composition. Those we have analyzed have contained about one-half the carbohydrate content of the fresh fruits.

Saccharin may be used as a sweetening agent. The amount taken in one day should not exceed 1 grain. Saccharin should not be cooked with an acid but should be added to the cooled product.

Clear broth without fat, and broth made from bouillon cubes may be used in moderate amounts. The food value need not be caunted if the total amount is limited to 400 grams a day.

SAMPLE EPILEPSY DIET CHARTS

Calories........ Carbohydrate 10 Protein........ Fat........

FOOD	*Breakfast, Grams*	*Dinner, Grams*	*Supper, Grams*	*Total Grams*	*GRAMS*		
					Carbohydrate	*Protein*	*Fat*
Vegetables Spinach		50		50	1.5	1	
Celery			50	50	1.5	0.5	
Fruits Orange	30			30	3		
Bran soya muffins	1	½	½	2	1.2	8	14
Cream 20%							
Cream 40%	30	40	30	100	3	2	40
Bacon							
Eggs							
Meat							
Fish							

Total grams 10.2

SAMPLE EPILEPSY DIET CHARTS—*Continued*

Calories........ Carbohydrate 25 Protein........ Fat........

FOOD	*Breakfast, Grams*	*Dinner, Grams*	*Supper, Grams*	*Total Grams*	*GRAMS* Carbohydrate	*GRAMS* Protein	*GRAMS* Fat
Vegetables Spinach		100		100	3	2	
Head lettuce			50	50	1.5	0.6	
Swiss chard			60	60	3	1	
Fruits Grapefruit	60			60	6		
Strawberries			40	40	2	0.4	
Walnuts		12		12	1.5	2.1	7.6
Bran soya muffins	1	1	1	3	1.8	12	21
Cream 20%							
Cream 40%	50	75	75	200	6	4	80
Bacon							
Eggs							
Meat							
Fish							

Total grams 24.8

PELLAGRA

Cause.—This disease has been the subject of much study and discussion in this country in recent years. Voegtlin, in an article published in a Report of the United States Public Health Service (Reprint 597 of Public Health Report), summarize the current findings on pellagra as follows:

"1. The hypothesis that there is a causal relation between pellagra and a restricted vegetable diet has been substantiated by direct proof to this effect and has led to results of considerable practical and scientific value.

"2. The metabolism in pellagra shows certain definite changes from the normal, which point to decreased gastric secretion and increased intestinal putrefaction.

"3. In the treatment and prevention of pellagra, diet is the essential factor. The disease can be prevented by an appropriate change in the diet without changing other sanitary conditions.

"4. A diet of the composition used by the pellagrins prior to their attack by the disease leads to malnutrition and certain pathological changes in animals, resembling those found in pellagra. A typical pellagrous dermatitis has not been observed in animals. Pellagrous symptoms have been produced in man by the continued consumption of a restricted vegetable diet.

"5. The nature of the dietary effect has not been discovered, although certain observations point to a combined deficiency in some of the recognized dietary factors as the cause of the pellagrous syndrome."

Dietary Adjustment.—Pellagra, so far as it is known, is a nutritional disturbance, and the feeding experiments conducted by Drs. Goldberger and Tanner in Geogria, proved that it could be prevented by the inclusion of a given amount of milk or lean beef.

It is probable that other food materials contain the so

called P. P. (pellagra preventive) but the amounts necessary to prevent the development of the disease has not been so accurately determined.

It is to be noted that diets lacking in fresh meat, fish, eggs and milk, and possibly whole wheat, are conducive to the development of pellagra. It may be the lack of the A and B vitamins, the poor quality of proteins in the diets commonly used in districts where pellagra is common, but whatever the cause our best results are obtained from an allowance of 200 grams of fresh lean beef, or 44 ounces (1320 grams) of milk. Dr. Goldberger found that buttermilk had the same preventive and curative effect that whole milk exhibited. This is fortunate since in many regions where pellagra is common buttermilk is liked better than whole sweet milk.

The condition of the patient's mouth in pellagra, even before the disease has advanced greatly, makes the administration of milk and milk products easier than of almost any other food material, its nonstimulating or irritating effects upon the mucous linings of the mouth and throat as well as its lack of distinctive flavor is most welcome when every kind of food is difficult to swallow on account of the extreme soreness in the mouth.

In administering the milk diet it is necessary to reënforce it sufficiently to bring up the protein intake to cover the nitrogen needs of the individual, 1320 c.c. of milk contains approximately 43 grams of protein, enough for the maintenance of nitrogen equilibrium, but the inclusion of 3 to 4 eggs each day will probably make the patient feel more comfortable. Farina, cream of wheat, malted milk or Mellin's food, may be added to bring up the fuel value to cover the energy requirements of the patient. The same general method of estimating the diet is used in pellagra as in other therapeutic conditions, thus:

	P.	C.	F.
44 ounces of milk (1320 c.c.)	43	53	56
Eggs, 4	28		20
Spinach (puréed), 200 gms. (for soup) ...	4	6	
Flour, for thickening 4 T. (sifted), 30 gms.	3	23	2
Butter, 2 T., 30 gms.			26
For reënforcing:			
Mellin's food, 5 T. (35 gms.)	3.5	25	
Malted milk (Horlick's) 7 T. 60 gms.	8	40	6
Total value of diet with Mellin's food as reënforcing agent would approximate ..	81	107	104
Total calories 1688			
Using Horlick's malted milk as reënforcing agent the value of the diet would be	86	122	110
Total calories 1822.			

Pernicious Anemia

The dietary management of pernicious anemia is a problem which should interest physicians, dietitians, and nurses alike. The disease has always presented so many obstacles in the pathway toward health, that any treatment which is instrumental in overcoming any of them must be looked upon as a decided step forward.

Drs. Minot and Murphy, of Boston, report a distinct improvement in the health of pernicious anemia patients resulting from a special diet devised by them. This diet is composed of foods rich in complete proteins, particularly liver, and containing an abundance of muscle meat, fruits and green vegetables, and low in fat.

The outline of this diet together with a sample menu is included here through the courtesy of Dr. George R. Minot.[5]

"The daily requirements of the diet in order of their importance are:

(1) Liver calves, beef, or chicken or kidneys (lamb), freshly cooked. At least 120, preferably 200 or more grams

[5] Treatment of Pernicious Anemia by a Special Diet, by George R. Minot, M.D., and William P. Murphy, M.D. Pub. Jour. Am. Med. Assn., Aug. 14, 1926.

(cooked weight). Cook without fat; broil, bake, boil, mince or make into soup.

(2) Fruits, preferably fresh, especially peaches, apricots, pineapple, strawberries, oranges and grapefruit—about 400 grams. Raisins desirable; allow them to be eaten freely.

(3) Red muscle meat, trimmed free of fat, freshly cooked; 125 grams or more. Beef heart desirable.

(4) Vegetables containing 1 to 10 per cent carbohydrate, preferably fresh, cooked or raw; not less than 300 grams. Lettuce, spinach, asparagus, cabbage and tomatoes especially desirable.

(5) Fats restricted, not over 70 grams. Avoid cheese, bacon, fried food. Allow but little cream and butter and not over one egg. Use mineral oil for salad dressings.

(6) Avoid grossly sweet foods, yet allow sugar sparingly.

(7) Starchy foods, as cereals, potato, breads, add to suit individual's desires, but not to exclusion of requirements given above. Starchy foods such as crusty or dextrinated whole wheat toast is desirable.

(8) Milk had best be limited to about 240 grams.

(9) Avoid excess of salt.

Tea and coffee as desired.

From the above outline it is seen that the diet is high in protein, purins and iron. Particular stress is laid upon the attractiveness of service.

Drs. Minot and Murphy advise the serving of several small meals each day rather than three average meals. The likes and dislikes of the patient must be considered but the obligatory articles must be eaten. This will require extra effort on the part of the nurse to prepare them as palatably as possible.

In persistent diarrhea it may be necessary to reduce the fruit and to purée the vegetables.

When it is impossible for the patient to take much food it is important that he eat some liver or kidneys (chicken gizzard may be substituted). The starch foods are given in accordance with the amount of other foods eaten.

"Present information suggests that the patient should continue with this type of diet even though his red blood cell count remains high.

The full diet should contain for the average person about 2500 calories; the protein being about 135 grams; the carbohydrates 340 grams, and fats not over 70 grams. This is the approximate composition of the food, given below:

Breakfast

Approximate Weight in Grams

Liver or kidneys, broiled	100
Oatmeal, 2 heaping tablespoons cooked, or dry meal	18
Milk, 3 tablespoons	45
Sugar, 2 level teaspoons	10
Toast, 3 slices (each slice 4 x 2 x 1/4 inches)	30
Butter, 1 level teaspoon, or a piece 1 x 1 x 1/2 inches	5
Fruits, choice of:	
(a) Orange, average size	120
(b) Strawberries, 5 1/2 tablespoons	180
(c) Grapefruit, 1/2 of one very large one	200
(d) Peach, 1 large one	120

Dinner

Beef, steak or roast, trimmed of fat; a very large serving	120
Vegetables, freshly cooked, as spinach, string beans, cabbage, tomato, etc., 2 average portions or 5 to 8 tablespoons	250
Potato, baked, medium size	130
Bread, 2 slices (each slice 3 x 4 x 1/2 inches)	70
Salad: Pineapple, 2 1/2 slices of size in cans	140
Lettuce, big helping	75
Pudding, made of	
(1) Gelatin, 1 teaspoon (dry weight)	2
(2) Rice, boiled, 2 heaping tablespoons	160
(3) Raisins, 20 large ones	50
(4) Milk, 2 tablespoons	30

(Fruits may be put into such a dessert and raisins eaten separately.)

SUPPER

Liver soup, composed of:	
(1) Liver, minced	100
(2) Milk, 1 tumblerful	220
(3) Flour (white), 1 teaspoon	4
(4) Butter, 1 rounded teaspoon or a piece 1 x 1 x 7/8 inches	10
Lamb, roast, without fatty parts, 2 small slices	60
Macaroni, boiled, 3 tablespoons	150
or	
Potato, small one, or rice, 1 heaping tablespoon	80
Vegetables, fresh, 2 average portions 5 to 8 tablespoons	250
Uneeda biscuits or triscuits, 4	25
Butter, 1 level teaspoon or a piece 1 x 1 x 1/2 inches	5
Choice of:	
(a) Strawberries, 7 tablespoons	225
(b) Orange, large one	150
(c) Apricots, or prunes, stewed, 2 tablespoons	100
Sugar, 2 heaping teaspoons	20

A vegetable soup could be taken in the place of the liver soup and the liver eaten in the following form: Mince it and mix with rice or potato and the allowance of butter, and stuff into green peppers.

The following menu gives an example of a suitable diet for a day with fewer calories than that given above. The food listed contains about 2050 calories, derived from about 115 grams of protein, 65 of fat, and 250 of carbohydrate.

BREAKFAST

Approximate Weight in Grams

Fruit, choice of:	
(a) Orange juice, from 2 oranges	130
(b) Grapefruit, 1 whole medium sized one	240
(c) Strawberries, 5½ tablespoons	180
Shredded wheat, 1 biscuit	30
Milk, 2 tablespoons	30
Sugar, 1 level teaspoon	5

Beef, minced, 2 heaping tablespoons	75
Cream, 20 per cent., 4 tablespoons	60
Toast, 2 slices (each slice 4 x 2 x ¼ inches)	20
Butter, 1 rounded teaspoon or a piece 1 x 1 x ⅞ inches	10

Luncheon

Liver, broiled	120
Lettuce or cold slaw, large helping	80
Potato, cold, sliced, or baked hot, 1 small one	80
Tomato, stewed, 5 tablespoons, or raw, 2 medium sized ones	150
Cauliflower or Brussels sprouts, an average portion or 3 tablespoons	130
Zwieback, 2 pieces	30
Butter, 1 level teaspoon or a piece 1 x 1 x ½ inches	5
Apricots, stewed, 3 heaping tablespoons	120

Dinner

Soup, consomme (any amount desired), mixed with sieved liver (flavor with spice)	75
Mutton, 2 large slices, trimmed of fat	100
Beets or peas, 3 tablespoons	100
Potato, boiled, average size	130
Spinach, or string beans, an average portion or 3 to 5 tablespoons	150
Butter, 1 level teaspoon or a piece 1 x 1 x ½ inches	5
Toast, 2 slices (each slice 4 x 2 x ¼ inches)	20
Blanc mange, 2 heaping tablespoons (made of ¼ cup Irish moss, 2 cups milk, 1 tablespoon cream, 20 per cent., 2 teaspoons sugar)	100
Blueberries, 5 tablespoons, or 2 tablespoons apple sauce with 1 level teaspoon (5 grams) of sugar	80

(Fruit could be mixed with blanc mange.)

APPENDIX

TABLE IV [1]

EDIBLE ORGANIC NUTRIMENTS AND FUEL VALUES OF FOODS*

Food		Protein (N×6.25) Per Cent	Fat Per Cent	Carbo-hydrate Per Cent	Fuel Value per Pound Calories	100 Calorie Portion Grams
Almonds . .	E. P.†	21.0	54.9	17.3	2940	15
	A. P.†	11.5	30.2	9.5	1615	28
Apples . .	E. P.	.4	.5	14.2	285	159
	A. P.	.3	.3	10.8	214	212
Apricots . .	E. P.	1.1	—	13.4	263	174
	A. P.	1.0	—	12.6	247	184
Artichoke, French . .	E. P.	3.4	.5	12.0	300	151
	A. P.	1.7	.3	6.0	150	302
Asparagus, fresh	E. P.	1.8	.2	3.3	100	450
cooked . . .	A. P.	2.1	3.3	2.2	213	213
Avocado . .	E. P.	2.1	20.1	7.4	993	46
	A. P.	1.4	13.2	4.8	652	70
Bacon, smoked	E. P.	10.5	64.8	—	2840	16
	A. P.	9.5	59.4	—	2372	19
Bananas . .	E. P.	1.3	.6	22.0	447	101
	A. P.	.8	.4	14.3	290	156
Barley, pearled		8.5	1.1	77.8	1615	28
Beans, dried .		22.5	1.8	59.6	1565	29
Lima, dried .		18.1	1.5	65.9	1586	29
Lima, fresh .	E. P.	7.1	.7	22.0	557	82
	A. P.	3.2	.3	9.9	250	182
string, fresh	E. P.	2.3	3.	7.4	184	241
	A. P.	2.1	3.	6.9	176	259
baked, canned	A. P.	6.9	2.5	19.6	583	78
red kidney, canned .		7.0	.2	18.5	471	96

[1] Courtesy of Dr. Henry Sherman.

* The percentages of nutrients are taken from Bull. 28, Office of Experiment Stations, U. S. Department of Agriculture. The fuel values are calculated from these percentages by the use of the factors explained in Chapter II, viz.—protein, 4 calories; fat, 9 calories; carbohydrate, 4 calories per gram.

† E. P. signifies edible portion; A. P. signifies as purchased.

TABLE IV—*Continued*

Food		*Protein* (N×6.25) *Per Cent*	*Fat Per Cent*	*Carbo-hydrate Per Cent*	*Fuel Value per Pound Calories*	*100 Calorie Portion Grams*
Beef, brisket, medium fat	E. P.	15.8	28.5	—	1449	31
	A. P.	12.0	22.3	—	1130	40
chuck, average	E. P.	19.2	15.4	—	978	46
	A. P.	15.8	12.5	—	797	58
corned, average . .	E. P.	15.6	26.2	—	1353	34
	A. P.	14.3	23.8	—	1230	37
cross ribs, average .	E. P.	15.9	28.2	—	1440	32
	A. P.	13.8	24.8	—	1262	36
dried, salted, and smoked	E.P.	30.0	6.5	.4	817	56
	A. P.	26.4	6.9	—	760	60
flank, lean .	E. P.	20.8	11.3	—	838	54
	A. P.	20.5	11.0	—	821	55
fore quarter, lean . .	E. P.	18.9	12.2	—	842	54
	A. P.	14.7	9.5	—	655	69
fore shank, lean	E. P.	22.0	6.1	—	647	70
	A. P.	14.0	3.9	—	414	110
heart . . .	E. P.	16.0	20.4	1.0	1140	40
	A. P.	14.8	24.7	.9	1292	35
hind quarter, lean . .	E. P.	20.0	13.4	—	907	50
	A. P.	16.7	11.2	—	757	60
hind shank, lean	E. P.	21.9	5.4	—	617	75
	A. P.	9.1	2.2	—	255	179
hind shank, fat	E. P.	20.4	18.8	—	1171	40
	A. P.	9.9	9.1	—	552	83
liver . . .	E. P.	20.4	4.5	1.7	584	78
	A. P.	20.2	3.1	2.5	537	85
loin . . .	E. P.	19.7	12.7	—	877	52
	A. P.	17.1	11.1	—	764	60
neck, lean .	E. P.	21.4	8.4	—	732	62
	A. P.	15.1	5.9	—	493	93
neck, medium fat . . .	E. P.	20.1	16.5	—	1040	44
	A. P.	14.5	11.9	—	749	61
plate, lean .	E. P.	15.6	18.8	—	1051	43
	A. P.	13.0	15.5	—	867	52

TABLE IV—*Continued*

Food		*Protein* (N×6.25) *Per Cent*	*Fat Per Cent*	*Carbo-hydrate Per Cent*	*Fuel Value per Pound Calories*	*100 Calorie Portion Grams*
Porterhouse steak	E. P.	21.9	20.4	—	1230	37
	A. P.	19.1	17.9	—	1077	42
rib rolls, lean	A. P.	20.2	10.5	—	795	57
ribs, lean	E. P.	19.6	12.0	—	845	54
	A. P.	15.2	9.3	—	654	69
ribs, fat	E. P.	15.0	35.6	—	1721	26
	A. P.	12.7	30.6	—	1480	31
round, lean	E. P.	21.3	7.9	—	709	64
	A. P.	19.5	7.3	—	649	70
round, free from visible fat		23.2	2.5	—	512	87
rump, lean	E. P.	20.9	13.7	—	940	49
	A. P.	19.1	11.0	—	796	57
rump, fat	E. P.	16.8	35.7	—	1763	26
	A. P.	12.9	27.6	—	1361	33
sides, lean	E. P.	19.3	13.2	—	890	51
	A. P.	15.5	10.6	—	715	64
sirloin steak	E. P.	18.9	18.5	—	1099	41
	A. P.	16.5	16.1	—	960	48
sweetbreads	A. P.	16.8	12.1	—	799	57
tenderloin	A. P.	16.2	24.4	—	1290	35
tongue	E. P.	18.9	9.2	—	717	63
	A. P.	14.1	6.7	—	529	86
Beets, cooked	E. P.	2.3	.1	7.4	180	252
fresh	E. P.	1.6	.1	9.7	209	217
	A. P.	1.3	.1	7.7	167	271
Blackberries	A. P.	1.3	1.0	10.9	262	173
Blackfish	E. P.	18.7	1.3	—	393	116
	A. P.	7.4	.7	—	163	279
Bluefish	E. P.	19.4	1.2	—	402	113
	A. P.	10.0	.6	—	206	220
Boston crackers		11.0	8.5	71.1	1835	25
Brazil nuts	E. P.	17.0	66.8	7.0	3162	14
	A. P.	8.6	33.7	3.5	1591	28
Bread, Boston brown		6.0	6.3	54.0	1345	34
graham		8.9	1.8	52.1	1189	38
rolls, water		9.0	3.0	54.2	1268	36
toasted		11.5	1.6	61.2	1385	33

TABLE IV—*Continued*

Food		*Protein* (N×6.25) *Per Cent*	*Fat Per Cent*	*Carbo-hydrate Per Cent*	*Fuel Value per Pound Calories*	*100 Calorie Portion Grams*
white, home-made . .		9.1	1.6	53.3	1199	38
milk . . .		9.6	1.4	51.1	1158	39
Vienna . .		9.4	1.2	54.1	1199	38
average white		9.2	1.3	53.1	1182	38
whole wheat .		9.7	.9	49.7	1113	41
Buckwheat flour		6.4	1.2	77.9	1580	29
Butter . . .		1.0	85.0	—	3491	13
Buttermilk . .		3.0	.5	4.8	162	280
Butternuts . .	E. P.	27.9	61.2	3.5	3065	15
	A. P.	3.8	8.3	.5	417	109
Cabbage . .	E. P.	1.6	.3	5.6	143	317
	A. P.	1.4	.2	4.8	121	376
Calf's foot jelly		4.3	—	17.4	394	115
Carrots, fresh .	E. P.	1.1	.4	9.3	204	221
	A. P.	.9	.2	7.4	158	286
Cauliflower .	A. P.	1.8	.5	4.7	139	328
Celery . . .	E. P.	1.1	.1	3.3	84	542
	A. P.	.9	.1	2.6	68	672
Celery soup, canned . .		2.1	2.8	5.0	243	187
Cerealine . .		9.6	1.1	78.3	1640	28
Chard . . .	E. P.	3.2	.6	5.0	173	262
Cheese, American pale .		28.8	35.9	.3	1990	23
American red		29.6	38.3	—	2102	22
Cheddar . .		27.7	36.8	4.1	2080	22
cottage . .		20.9	1.0	4.3	499	91
full cream .		25.9	33.7	2.4	1890	24
Fromage de Brie . .		15.9	21.0	1.4	1170	39
Neufchâtel .		18.7	27.4	1.5	1484	31
pineapple .		29.9	38.9	2.6	2180	21
Roquefort .		22.6	29.5	1.8	1645	28
Swiss . .		27.6	34.9	1.3	1945	23
Cherries, fresh .	E. P.	1.0	.8	16.7	354	128
	A. P.	.9	.8	15.9	337	134
canned . .	A. P.	1.1	.1	21.1	407	112
Chestnuts, fresh	E. P.	6.2	5.4	42.1	1098	41
	A. P.	5.2	4.5	35.4	920	49

TABLE IV—*Continued*

Food		*Protein* (N×6.25) *Per Cent*	*Fat Per Cent*	*Carbo-hydrate Per Cent*	*Fuel Value per Pound Calories*	*100 Calorie Portion Grams*
Chicken, broilers	E. P.	21.5	2.5	—	493	92
	A. P.	12.8	1.4	—	289	157
Chocolate . .		12.9	48.7	30.3	2768	16
Cocoa . . .		21.6	28.9	37.7	2258	20
Cod, dressed .	A. P.	11.1	.2	—	209	217
salt . . .	E. P.	25.4	.3	—	473	96
	A. P.	19.0	.4	—	361	126
Consommé, canned . .	A. P.	2.5	—	.4	53	862
Corn, green, canned . .		2.8	1.2	19.0	455	102
sweet, fresh .	E. P.	3.1	1.1	19.7	459	99
	A. P.	1.2	.4	7.7	178	255
Corn meal . .		9.2	1.9	75.4	1620	28
Cowpeas, dried		21.4	1.4	60.8	1550	29
green . . .	E. P.	9.4	.6	22.7	603	76
Crackers, butter	A. P.	9.6	10.1	71.6	1887	23
cream . .	A. P.	9.7	12.1	69.7	1938	23
graham . .	A. P.	10.0	9.4	73.8	1905	24
soda . . .	A. P.	9.8	9.1	73.1	1875	24
water . . .	A. P.	10.7	8.8	71.9	1855	24
Cranberries .	A. P.	.4	.6	9.9	212	212
Cream . . .		2.5	18.5	4.5	883	50
Cucumbers . .	E. P.	.8	.2	3.1	79	575
	A. P.	.7	.2	2.6	68	666
Currants, fresh		1.5	—	12.8	259	175
dried Zante .		2.4	1.7	74.2	1455	31
Dandelion greens		2.4	1.0	10.6	277	164
Dates, dried .	E. P.	2.1	2.8	78.4	1575	29
	A. P.	1.9	2.5	70.6	1416	32
Doughnuts . .		6.7	21.0	53.1	1941	23
Eggplant . .	E. P.	1.2	.3	5.1	126	349
Eggs, uncooked	E. P.	13.4	10.5	—	672	68
	A. P.	11.9	9.3	—	594	76
Farina . . .		11.0	1.4	76.3	1640	28
Figs, dried . .		4.3	.3	74.2	1437	32
Flounder . .	A. P.	5.4	.3	—	110	412
	E. P.	14.2	.6	—	282	161
Flour, rye . .		6.8	.9	78.7	1590	29

TABLE IV—*Continued*

Food		*Protein* (N×6.25) *Per Cent*	*Fat Per Cent*	*Carbo-hydrate Per Cent*	*Fuel Value per Pound Calories*	*100 Calorie Portion Grams*
Flour, *continued*						
wheat, California fine .		7.9	1.4	76.4	1585	29
wheat, entire		13.8	1.9	71.9	1630	28
wheat, graham		13.3	2.2	71.4	1628	28
wheat, patent baker's grade		13.3	1.5	72.7	1623	28
wheat, straight grade . .		10.8	1.1	74.8	1608	28
wheat, average high and medium .		11.4	1.0	75.1	1610	28
wheat, average low grade .		14.0	1.9	71.2	1625	28
Fowls . . .	E. P.	19.3	16.3	—	1017	45
	A. P.	13.7	12.3	—	752	60
Gelatin . . .		91.4	.1	—	1660	27
Grape butter .		1.2	.1	58.5	1088	42
Grapes . . .	E. P.	1.3	1.6	19.2	437	104
	A. P.	1.0	1.2	14.4	328	138
Grapefruit . .	E. P.	.6	.1	12.2	235	193
	A. P.	.4	.1	8.9	172	264
Haddock . .	E. P.	17.2	.3	—	324	140
	A. P.	8.4	.2	—	160	283
Halibut steaks .	E. P.	18.6	5.2	—	550	83
	A. P.	15.3	4.4	—	457	100
Ham, fresh lean	E. P.	25.0	14.4	—	1042	44
	A. P.	24.8	14.2	—	1030	44
fresh, medium	E. P.	15.3	28.9	—	1458	31
	A. P.	13.5	25.9	—	1303	35
smoked, lean .	E.P.	19.8	20.8	—	1209	38
	A. P.	17.5	18.5	—	1073	42
Herring, whole	E. P.	19.5	7.1	—	644	70
	A. P.	11.2	3.9	—	362	125
smoked . .	E. P.	36.9	15.8	—	1315	35
	A. P.	20.5	8.8	—	731	62
Hominy . .		8.3	.6	79.0	1609	28
Honey . . .		.4	—	81.2	1481	31
Huckleberries .		.6	.6	16.6	336	135
Kohl-rabi . .	E. P.	2.0	.1	5.5	140	324
Koumiss . . .		2.8	2.1	5.4	234	194

TABLE IV—*Continued*

Food		*Protein* (N×6.25) *Per Cent*	*Fat Per Cent*	*Carbo-hydrate Per Cent*	*Fuel Value per Pound Calories*	*100 Calorie Portion Grams*
Lamb, breast .	E. P.	19.1	23.6	—	1311	35
	A. P.	15.4	19.1	—	1058	43
chops, broiled .	E. P.	21.7	29.9	—	1614	28
fore quarter .	E. P.	18.3	25.8	—	1385	33
	A. P.	14.9	21.0	—	1127	40
hind quarter .	E. P.	19.6	19.1	—	1149	40
	A. P.	16.5	16.1	—	953	48
leg, roast . .		19.7	12.7	—	876	52
side . . .	E. P.	17.6	23.1	—	1263	36
	A. P.	14.1	18.7	—	1015	45
Lard, refined .		—	100.0	—	4080	11
Lemon juice . .		—	—	9.8	178	255
Lemons . . .	E. P.	1.0	.7	8.5	201	226
	A. P.	.7	.5	5.9	140	323
Lettuce . . .	E. P.	1.2	.3	2.9	87	525
	A. P.	1.0	.2	2.5	72	633
Liver, beef . .	E. P.	20.4	4.5	1.7	583	78
	A. P.	20.2	3.1	2.5	538	84
veal . . .	E. P.	19.0	5.3	—	562	81
Lobster, whole .	E. P.	16.4	1.8	.4	379	120
	A. P.	5.9	.7	.2	139	326
canned . . .	A. P.	18.1	1.1	.5	382	119
Macaroni . .		13.4	.9	74.1	1625	28
Macaroons . .		6.5	15.2	65.2	1922	24
Mackerel . .	E. P.	18.7	7.1	—	629	72
	A. P.	10.2	4.2	—	356	127
salt	E. P.	21.1	22.6	—	1305	35
	A. P.	16.3	17.4	—	1005	45
Marmalade, orange		.6	.1	84.5	1548	29
Milk, condensed, sweetened . .		8.8	8.3	54.1	1480	31
skimmed . .		3.4	.3	5.1	167	273
whole . . .		3.3	4.0	5.0	314	145
Mince meat, commercial . .		6.7	1.4	60.2	1280	36
home made .		4.8	6.7	32.1	942	48
Molasses, cane .		2.4	—	69.3	1302	35
Mushrooms . .	A. P.	3.5	.4	6.8	204	223
Muskmelons . .	E. P.	.6	—	9.3	180	252
	A. P.	.3	—	4.6	89	510

TABLE IV—*Continued*

Food		*Protein* (N×6.25) *Per Cent*	*Fat Per Cent*	*Carbo-hydrate Per Cent*	*Fuel Value per Pound Calories*	*100 Calorie Portion Grams*
Mutton, fore quarter	E. P.	15.6	30.9	—	1543	29
	A. P.	12.3	24.5	—	1223	37
hind quarter	E. P.	16.7	28.1	—	1450	31
	A. P.	13.8	23.2	—	1197	38
leg	E. P.	19.8	12.4	—	863	52
	A. P.	16.5	10.3	—	718	63
side	A. P.	13.0	24.0	—	1215	37
	E. P.	16.2	29.8	—	1512	30
Nectarines	E. P.	.6	—	15.9	299	152
	A. P.	.6	—	14.8	280	162
Oatmeal		16.1	7.2	67.5	1811	25
Okra	E. P.	1.6	.2	7.4	172	264
	A. P.	1.4	.2	6.5	152	300
Olives, green	E. P.	1.1	27.6	11.6	1357	33
	A. P.	.8	20.2	8.5	995	46
ripe	E. P.	1.7	25.0	4.3	1130	40
	A. P.	1.4	21.0	3.5	947	48
Onions, fresh	E. P.	1.6	.3	9.9	220	206
	A. P.	1.4	.3	8.9	199	228
Oranges	E. P.	.8	.2	11.6	233	195
	A. P.	.6	.1	8.5	169	268
Oxtail soup, canned	A. P.	3.8	.5	4.2	166	274
Oysters	E. P.	6.2	1.2	3.7	228	199
in shell	A. P.	1.2	.2	.7	43	1065
canned	A. P.	8.8	2.4	3.9	328	138
Parsnips	E. P.	1.6	.5	13.5	294	154
	A. P.	1.3	.4	10.8	236	192
Pea soup, canned	A. P.	3.6	.7	7.6	232	196
Peaches, canned	A. P.	.7	.1	10.8	213	213
fresh	E. P.	.7	.1	9.4	188	242
	A. P.	.5	.1	7.7	153	297
Peanuts	E. P.	25.8	38.6	24.4	2490	18
	A. P.	19.5	29.1	18.5	1877	24
Pears, fresh	E. P.	.6	.5	14.1	288	158
	A. P.	.5	.4	12.7	256	177
Peas, canned	A. P.	3.6	.2	9.8	252	180
dried		24.6	1.0	62.0	1611	28
green	E. P.	7.0	.5	16.9	454	100
	A. P.	3.6	.2	9.8	252	180

TABLE IV—*Continued*

Food		*Protein* (N×6.25) *Per Cent*	*Fat Per Cent*	*Carbo-hydrate Per Cent*	*Fuel Value per Pound Calories*	*100 Calorie Portion Grams*
Peppers, green . .	E. P.	1.1	.1	4.6	109	417
Persimmons . .	E. P.	.8	.7	31.5	615	74
Pies, apple . .		3.1	0.8	42.8	1233	37
custard . .		4.2	6.3	26.1	806	56
lemon . . .		3.6	10.1	37.4	1156	39
mince . . .		5.8	12.3	38.1	1300	35
squash . . .		4.4	8.4	21.7	817	56
Pineapples, fresh	E. P.	.4	.3	9.7	196	232
canned . .	A. P.	.4	.7	36.4	695	65
Pine nuts (pig-nolias) . .		33.9	49.4	6.9	2757	16
Pistachios, shelled . . .		22.3	54.0	16.3	2900	16
Plums . . .	E. P.	1.0	—	20.1	383	118
	A. P.	.9	—	19.1	363	125
Pomegranates .	E. P.	1.5	1.6	19.5	447	102
Pork chops, medium . .	E. P.	16.6	30.1	—	1530	30
	A. P.	13.4	24.2	—	1230	37
chuck ribs and shoulder .	E. P.	17.3	31.1	—	1585	29
	A. P.	14.1	25.5	—	1298	35
fat, salt . .	A. P.	1.9	86.2	—	3555	13
sausage . .	A. P.	13.0	44.2	1.1	2030	22
side . . .	E. P.	9.1	55.3	—	2423	19
	A. P.	8.0	49.0	—	2145	21
tenderloin . .	A. P.	18.9	13.0	—	875	52
Potato chips .	A. P.	6.8	39.8	46.7	2598	17
Potatoes, white, raw . . .	E. P.	2.2	.1	18.4	378	120
	A. P.	1.8	.1	14.7	302	149
sweet, raw .	E. P.	1.8	.7	27.4	558	81
	A. P.	1.4	.6	21.9	447	102
Prunes, dried .	E. P.	2.1	—	73.3	1368	33
	A. P.	1.8	—	62.2	1160	39
Pumpkins . .	E. P.	1.0	.1	5.2	117	389
	A. P.	.5	.1	2.6	60	753
Radishes . . .	E. P.	1.3	.1	5.8	133	341
	A. P.	.9	.1	4.0	91	488
Raisins . . .	E. P.	2.6	3.3	76.1	1562	29
	A. P.	2.3	3.0	68.5	1407	32

TABLE IV—*Continued*

Food		*Protein* (N×6.25) *Per Cent*	*Fat Per Cent*	*Carbo-hydrate Per Cent*	*Fuel Value per Pound Calories*	*100 Calorie Portion Grams*
Raspberries, red		1.0	—	12.6	247	184
black . . .		1.7	1.0	12.6	300	151
Rhubarb . . .	E. P.	.6	.7	3.6	105	433
	A. P.	.4	.4	2.2	63	714
Rice		8.0	.3	79.0	1591	29
Salmon, dressed	A. P.	13.8	8.1	—	582	78
whole . . .	E. P.	22.0	12.8	—	923	49
	A. P.	15.3	8.9	—	642	71
Sausage, Bologna	E. P.	18.7	17.6	.3	1061	43
	A. P.	18.2	19.7	—	1135	40
farmer . . .	E. P.	29.0	42.0	—	2240	20
	A. P.	27.9	40.4	—	2156	21
Shad, whole . .	E. P.	18.8	9.5	—	727	61
	A. P.	9.4	4.8	—	367	124
roe		20.9	3.8	2.6	582	78
Shredded wheat		10.5	1.4	77.9	1660	27
Spinach, fresh .	A. P.	2.1	.3	3.2	109	417
Squash . . .	E. P.	1.4	.5	9.0	209	217
	A. P.	.7	.2	4.5	103	443
Strawberries .		1.0	.6	7.4	169	269
Succotash, canned		3.6	1.0	18.6	444	102
Sugar . . .		—	—	100.0	1815	25
Tomatoes, fresh	A. P.	.9	.4	3.9	104	438
canned . .	A. P.	1.2	.2	4.0	103	443
Tuna (tunny fish)	E. P.	26.6	11.4	—	946	48
Turkey . . .	E. P.	21.1	22.9	—	1320	34
	A. P.	16.1	18.4	—	1042	43
sandwich, canned . .		20.7	29.2	—	1568	29
Turnips . . .	E. P.	1.3	.2	8.1	178	256
	A. P.	.9	.1	5.7	124	367
Veal, breast . .	E. P.	20.3	11.0	—	817	56
	A. P.	15.3	8.6	—	629	72
cutlet . . .	E. P.	20.3	7.7	—	683	66
	A. P.	20.1	7.5	—	670	68
fore quarter .	E. P.	20.0	8.0	—	690	66
	A. P.	15.1	6.0	—	517	88
hind quarter .	E. P.	20.7	8.3	—	715	64
	A. P.	16.2	6.6	—	534	85
side . . .	E. P.	20.2	8.1	—	697	65
	A. P.	15.6	6.3	—	539	84

TABLE IV—*Continued*

Food		*Protein* (N×6.25) *Per Cent*	*Fat Per Cent*	*Carbo-hydrate Per Cent*	*Fuel Value per Pound Calories*	*100 Calorie Portion Grams*
Vegetable soup, canned . .		2.9	—	.5	62	735
Walnuts, California or English . .	E. P.	18.4	64.4	13.0	3199	14
	A. P.	4.9	17.3	3.5	859	53
black . . .	E. P.	27.6	56.3	11.7	3011	15
	A. P.	7.2	14.6	3.0	780	59
Watermelons .	E. P.	.4	.2	6.7	136	332
	A. P.	.2	.1	2.7	57	800
Wheat, cracked .		11.1	1.7	75.5	1635	28
Whitefish . .	E. P.	22.9	6.5	—	680	67
	A. P.	10.6	3.0	—	315	144
Zwieback . . .		9.8	9.9	73.5	1915	24

TABLE V

Organic-Inorganic and Vitamin Value of Approximate Average Serving of Food Materials[1]

Food Materials	Approx. Measure Average Serving	Wt. Gms.	Coh. Gms.	Prot. Gms.	Fat Gms.	Cal.	Ca. Gm.	P. Gm.	Fe. Gm.	A	B	C
Almonds, E. P.	10 nuts	10	2	2	6	70	.024	.046	.0004	+	++	*
Apples, baked	1 medium, 1 T. sugar	120	30	1		124	.008	.014	.0004			
Apples, raw	⅔ medium (1 small)	100	14			56	.007	.012	.0003	+	+ to ++	++
Apple Sauce	½ cup	125	30	1	1	133	.007	.012	.0003			
Apricots, canned	6 halves	100	17	1		72	.014	.025	.0003			
Apricots, dried	¼ c. (8 small halves)	50	31	2		132	.033	.058	.0007			
Apricots, fresh, E. P.	3 medium	100	13	1		56	.014	.025	.0003			
Artichoke	1 medium (A. P. 150 gms.)	50	6	2		32	?	?	?	++	+	*
Asparagus, canned	8 small tips (½ c.)	100	3	2		20	.025	.039	.0010			
Asparagus, fresh	10 stalks, 5″ long	100	3	2		20	.025	.039	.0010	*	+++?	*
Avocado, A. P.	½ medium	120	9	4	15	187	?	?	?	+	++	*
Bacon, cooked (smoked)	3 slices, drained	21		2	7	71	.001	.023	.0003			
Bacon, raw (smoked)	3 slices	30		3	19	183	.002	.032	.0005	— to +	+ to ++	?
Banana	1 small (⅔ medium)	100	22	1		92	.009	.031	.0006	+ to ++	+ to ++	++
Barley, Pearled	3 T.	30	23	3		104	.006	.054	.0006	+	++	—

Coh. = Carbohydrates; Prot. = Protein; Cal. = Calories; Ca. = Calcium; P. = Phosphorus; Fe. = Iron; A. P. = As Purchased; E. P. = Edible Portion; c. = Standard level cupful; T. = Standard level tablespoonful; tsp. = Standard level teaspoonful; ″ = inches.

Vitamins: + = some; ++ = good source; +++ = excellent source; — = no appreciable amount; ? = doubt as to presence or relative amount; * = evidence is lacking or appears insufficient. Vitamin content of bread based on flour.

References: Sherman, U. S. Bulletin No. 28, Stanford University Hospital (Calif.), Wheeler, Rose.

30 grams per ounce instead of the fractional 28.35 grams per ounce is used to simplify the calculation.

[1] D Vitamin—See Food Relations Table.

TABLE V—*Continued*

Food Materials	*Approx. Measure Average Serving*	*Wt. Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*	*Ca. Gm.*	*P. Gm.*	*Fe. Gm.*	*A*	*B*	*C*
Beans, Kidney, canned	½ c.	100	19	7		104	.039	.142	.0015	+	+++	*
Beans, Lima, dry	3 T. (⅓ c. cooked, 80 gms.)	30	20	5		100	.021	.101	.0021			
Beans, Lima, fresh	½ c.	100	22	7		116	.028	.133	.0020			
Beans, Navy, dry	3 T. (⅓ c. cooked, 80 gms.)	30	18	7		100	.005	.131	.0021	+	+++	*
Beans, Soy, dry	3 T. (½ c. cooked, 80 gms.)	30	9	11	5	125	?	?	?	+	+++	*
Beans, String, canned	½ c.	100	5	1		24	.046	.052	.0011	++	++	*
Beans, String, fresh	⅔ c.	100	7	2		36	.046	.052	.0011	++	++	++
Beef-juice[2]	½ c.	100		5	1	29	.003 .008	.054 .031	.0007 .0526	*	+	— to +
Beef, lean, chopped	¼ c. packed (2 cakes)	60		14	3	83	.008	.150	.0021	+	++	— to +
Beef, roast (lean)	2 slices 4½″x2½″x⅛″	50		14	3	83	.008	.150	.0021	+	++	— to +
Beefsteak, medium fat	1 piece 2″x3″x1″	50		12	8	120	.008	.150	.0021	+	++	— to +
Beets, fresh	⅔ c.	100	10	2		48	.029	.039	.0006	+	+	+
Biscuit (wheat flour)	2 biscuits 2″x¾″	50	24	4	4	148	.024	.041	.0004			
Blackberries	⅔ c.	100	10	1		44	.017	.021	.0006			
Brains, beef	⅙ set	50		4	5	61	.002	.043	.0006	+	++	*
Bran, unwashed	4 T.	13					.016	.158	.0010	+	++	—
Bread, corn, water	1 piece 2½″x4″x1″	34	6	3	4	72	.005	.053	.0002			
Bread, graham	1 slice 3″x3½″x½″	30	16	3	1	85	.015	.065	.0007	+	++	
Bread, rye	1 slice 3″x3½″x½″	30	16	3		76	.007	.044	.0005			
Bread, white, milk	1 slice 3″x3½″x½″	30	16	3		76	.008	.028	.0003	+	+	— to +
Bread, white, water	1 slice 3″x3½″x½″	30	15	3		72	.008	.028	.0003	?	+	—

[2] Second figures for mineral salts based on composition of blood.

TABLE V—*Continued*

Food Materials	*Approx. Measure Average Serving*	*Wt. Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*	*Ca. Gm.*	*P. Gm.*	*Fe. Gm.*	*A*	*B*	*C*
Bread, whole wheat .	1 slice 3″x3½″x½″	30	15	3		72	.015	.052	.0005	++	++	— to +
Brussels Sprouts . .	⅔ c.	100	3	1		16	.027	.120	.0011			
Butter	1 square (2 tsp.) .	10			9	81	.001	.002	.00002	+++	—	—
Buttermilk . . .	1 average glass .	200	10	6	1	73	.210	.194	.0005	+	++	+ Variable
Cabbage, cooked . .	¾ c.	100	6	1		28	.045	.029	.0011	+	++	+
Cabbage, raw . . .	⅔ c. (shredded) .	50	3	1		16	.023	.014	.0005	+	++	+++
Cantaloupe, E. P. .	½ medium . .	200	18	2		80	.034	.030	.0006	++	++	*
Carrots, fresh . . .	¾ c.	100	9	1		40	.056	.046	.0006	+++	++	++
Cauliflower . . .	¾ c.	100	6	1		28	.123	.061	.0006	+	++	+
Celery	¾ c. cooked or 4 stalks fresh .	100	3	1		16	.078	.037	.0005	— to +	++	*
Chard	⅔ c.	100	3	1		16	.150	.040	.0025	++	+ to ++	*
Cheese, American .	1-inch cube . .	20		6	7	87	.186	.137	.0003	++ to +++	—?	*
Cheese, Cottage . .	4 T.	60	2	13	1	69	.559	.410	.0008	+	*	*
Cheese, Pa. Cream .	⅜ cake	20	1	5	7	87	.186	.137	.0003			
Cherries, canned, E. P.	12 medium . .	100	21	1		88	.019	.031	.0004			
Cherries, fresh, E. P.	12 medium . .	70	16	1		68	.013	.022	.0003			
Chicken, broiler . .	½ medium (130 gms. A. P.), E. P. .	75		17	5	113	.010	.183	.0026			
Chicken, fowl . . .	2 slices, 2″x2″x⅛″	50		13	1	61	.008	.140	.0020			
Chocolate	1 square . . .	30	9	4	15	187	.028	.137	.0008			
Cocoa	2 tsp.	5	2	1	1	21	.006	.035	.0001			
Cocoanut, dried . .	¼ c.	21	7	1	12	140	.012	.033	?	+	++	*
Cocoanut, fresh . .	1 slice 2″x2″x½″ .	34	9	2	17	197	.008	.025	?			
Corn Flakes . . .	½ c.	15	12	1		52	.001	.015	.0001	+	++	—
Corn, canned . . .	4 T.	100	19	3	1	97	.006	.103	.0008			

TABLE V—*Continued*

Food Materials	*Approx. Measure Average Serving*	*Wt. Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*	*Ca. Gm.*	*P. Gm.*	*Fe. Gm.*	*A*	*B*	*C*
Corn, fresh	⅜ c. (1 medium ear)	100	20	3		92	.006	.103	.0008			
Cornmeal, dry	3 T.	30	22	3		100	.005	.057	.0003	— to +	—	—
Corn Syrup	1 T.	30	25			100	.002	.031	.0002			
Crackers, graham	1 cracker	10	7	1	1	41	?	?	?			
Crackers, soda	1 cracker	9	7	1	1	41	.002	.009	.0001			
Cranberries	⅔ c.	100	10			40	.018	.013	.0006	*	*	+
Cream, 20%	2 T.	30	1	1	6	62	.026	.020	.0001	+++	++	+
Cream, 40%	2 T.	30	1		12	112	.026	.020	.0001	+++	++	+
Cucumber	10 medium slices	100	3	1		16	.016	.033	.0002	— to +	+	++?
Dandelion, greens	½ c. cooked	100	5	1		24	.105	.072	.0027	++	++	+
Dates	4 small	25	20	1	1	93	.016	.014	.0008			
Eggs, whole	1 average size	50		7	5	73	.034	.090	.0015	+++	+ to ++	—?
Egg, white	1 egg white	32		4		16	.005	.004		—	*	—?
Egg, yolk	1 egg yolk	18		3	5	57	.025	.094	.0015	+++	++	—?
Egg plant	½ c.	100	5	1		24	.011	.034	.0005	+	+	*
Endive	10 medium stalks	100	3	1		16	.104	.038	?	+	*	+
Farina, dry	2 T. (½ c. cooked, 100 gms.)	20	15	2		68	.004	.025	.0002			
Figs, dried	1 medium	25	19	1		80	.041	.029	.0008			
Figs, fresh	1 large (2 small)	25	5			20	.013	.009	?			
Fish, halibut	1 piece 2½″x1½″x ¾″	50		9	3	63	.010	.107	.0005	— to +	+	*
Fish, salmon, canned	½ c.	50		11	6	98	.012	.125	.0006	— to +	+	*
Fish, salmon, fresh	1 piece 3″x3″x½″	50		11	6	98	.008	.079	.0004	— to +	+	*
Fish, trout, brook	1 piece 3″x3″x½″	50		9	1	45	.010	.102	.0005	— to +	+	*
Flour, buckwheat	3 T. (unsifted)	30	23	2		100	.012	.068	.0004			
Flour, graham	3 T. (unsifted)	30	21	4		100	.012	.109	.0011			
Flour, rye	3 T. (unsifted)	30	24	2		104	.005	.087	.0004			

TABLE V—*Continued*

Food Materials	*Approx. Measure Average Serving*	*Wt. Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*	*Ca. Gm.*	*P. Gm.*	*Fe. Gm.*	A	B	C
Flour, white . . .	3 T. (unsifted) or 4 T. (sifted) .	30	23	3		104	.006	.028	.0003	—	— to +	—
Flour, whole wheat .	3 T. (unsifted) .	30	22	4		104	.009	.071	.0008	+	++	—
Frankfurters . . .	1—4½" long . .	31		6	6	78	.003	.065	.0009			
Gelatin, granulated .	1 tsp.	2		2		8	?	?	?			
Grapes, fresh . . .	24 grapes . . .	100	19	1	1	89	.019	.031	.0003	+	+ to ++	+
Grape-juice . . .	½ c.	100	25			100	.011	.011	.0003	+	+ to ++	+?
Grapefruit	½ small (4 large sections) . .	100	10			40	.021	.020	.0003	+	++	+++
Ham, smoked, lean .	2 slices 4½"x4"x⅛"	50		10	10	130	.007	.135	.0019	— to +	++	—
Heart, beef . . .	1 slice 2"x2¾"x¼"	50		8	10	122	.005	.086	.0012	+	+ to ++	+?
Hominy, raw . . .	4 T. (⅘ c. cooked, 80 gms.) . .	30	24	2		104	.003	.043	.0003			
Honey	1 T.	30	24			96	.001	.006	.0002	—	+?	—
Kidney, beef . . .	⅙ medium size . .	50		8	6	86	.005	.086	.0012	++	++	+?
Kohl-rabi	½ c.	100	5	2		28	.077	.071	.0006	*	*	+
Lamb chops (cooked)	1 medium 2"x2"x½"	45		10	13	157	.004	.077	.0011			
Lamb roast . . .	2 slices 4½"x2"x⅛"	50		10	6	94	.005	.086	.0012			
Lard	1 T.	15			15	135				— to +	—	—
Lemons	1 medium . . .	70	6			24	.025	.015	.0004	+	++	+++
Lemon juice . . .	½ c. scant . . .	100	10			40	.024	.010	?	+	++	+++
Lentils, dry . . .	2½ T.	30	18	8		104	.032	.131	.0026	+	++ to +++	—?
Lettuce	10 leaves (¼ small head) . . .	100	3	1		16	.043	.042	.0007	+ to ++	++	+++
Liver, beef . . .	1 slice 2"x2¾"x¼"	50	1	10	2	62	.021	.117	.0015	++ to +++	++	+

TABLE V—*Continued*

Food Materials	*Approx. Measure Average Serving*	*Wt. Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*	*Ca. Gm.*	*P. Gm.*	*Fe. Gm.*	*A*	*B*	*C*
Macaroni, dry	½ c. (½ c. cooked, packed, 100 gms.)	20	15	3		72	.004	.029	.0002			
Maple syrup	1 T.	30	21			84	.032	.004	.0009			
Margarine, nut[3]	1 T.	15			13	112				— to ++	—	—
Margarine, oleo	1 T.	15			12	108				— to ++	—	—
Mellin's Food[4]	1 T. (packed)	7	5	0.7		24	.001	.015	.0010			
Milk, condensed, sweetened	1 T.	15	8	1	1	45	.045	.035	.0001	+++	++	+ Variable
Milk, condensed, unsweetened	1 T.	15	2	1	1	21	.045	.035	.0001	+++	++	—?
Milk, malted, Horlick's	3½ T.	30	20	4	3	123	.102	.099	.0006	+?	++?	+?
Milk, powder, skim[5]	5½ T.	30	15	11	Trace	104	.352	.261	Trace	+	++	+ Variable
Milk, powder, whole[5]	5½ T.	30	11	8	8	148	.247	.184	Trace	+++	++	+ Variable
Milk, skimmed	1 average glass	180	9	6	1	69	.219	.173	.0004	+	++	+ Variable
Milk, whole	1 average glass	180	9	6	7	123	.216	.167	.0004	+++	++	+ Variable
Molasses	1 T.	25	17			68	.053	.011	.0018	—	+	*
Mushrooms, fresh	2 large (uncooked)	45	3	2		21	.008	.049	?	—	++	—
Muskmelon	½ c., cut in cubes	100	9	1		40	.017	.015	.0003			
Mustard, greens, cooked	½ c.	100	5	1		24	?	?	?			

[3] High grade Memphis product.

[4] M. F. Company's Analysis.

[5] Klim.

TABLE V—*Continued*

Food Materials	*Approx. Measure Average Serving*	*Wt. Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*	*Ca. Gm.*	*P. Gm.*	*Fe. Gm.*	*A*	*B*	*C*
Oatmeal, dry	⅓c. (⅔ c. cooked, 135 gms.)	30	20	5	2	118	.021	.109	.0011	— to +	++	—
Okra	½ c.	100	7	2		36	.071	.019	?	*	+++	?
Olives, green	4–5 olives	25	3		7	75	.031	.004	.0007			
Olives, ripe	4–5 olives	25	1		6	58	.031	.004	.0007			
Olive oil	1 T.	15			15	135				— to +	—	—
Onions, fresh	1 medium size	30	3			12	.010	.014	.0002	— to +	+	++
Oranges, E. P.	1 medium	100	12			48	.045	.021	.0002	+	++	+++
Orange juice	½ c. scant	100	14			56	.029	.016	.0002	+	++	+++
Oysters	6 large	100	4	6		40	.052	.155	.0045	*	*	+
Parsnips	¾ c.	100	14	2		64	.059	.076	.0006	— to +	++	*
Peaches, canned	2 large halves	100	11	1		48	.016	.024	.0003			
Peaches, fresh	1 medium 2″x2″ diameter	100	9	1		40	.016	.024	.0003	+	+ to ++	++
Peanut butter	2 T.	30	5	9	14	182	.021	.120	.0006	+	++	*
Peanuts, shelled	35 nuts	30	7	8	12	168	.021	.120	.0006	+	++	*
Pears, canned	2 halves	100	18			72	.015	.026	.0003			
Pears, fresh	1 medium	100	14			56	.015	.026	.0003	*	+	*
Peas, canned	½ c. scant	100	17	7		96	.028	.127	.0017	++	++	++
Peas, dried	3 T.	30	18	7		100	.025	.120	.0017	+	++	?
Peas, fresh	¾ c.	100	10	4		56	.028	.127	.0017	++	++	+++
Pecans, medium, E. P.	12 nuts	30	4	3	21	221	.027	.100	.0008	+	+	*
Peppers, green, E. P.	1 large (2 small)	100	5	1		24	.006	.026	.0004	++	*	*
Persimmons	1 medium	30	9			36	.007	.006	?			
Pineapple, canned with sugar	1 slice ¾″ thick	100	36			134	.018	.028	.0005	++	++	++?
Pineapple, fresh	1 slice ¾″ thick	100	10			40	.018	.028	.0005	++	++	++
Plums, fresh	4 small (2 large)	100	20	1		84	.020	.032	.0005			

TABLE V—*Continued*

Food Materials	*Approx. Measure Average Serving*	*Wt. Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*	*Ca. Gm.*	*P. Gm.*	*Fe. Gm.*	*A*	*B*	*C*
Pork, chop, E. P.	1 medium chop	75		15	14	186	.007	.162	.0023	— to +	+++?	—
Pork, side	1″ cube	15		1	8	76	.001	.011	.0002			
Potatoes, sweet, raw	½ c.	100	27	2		116	.019	.045	.0005	++	++	++
Potatoes, white, baked	1 medium 2″x4″	100	20	3		92	.014	.058	.0013	+	++	+ to ++?
Potatoes, white, raw	½ c.	100	18	2		80	.014	.058	.0013	+	++	++
Prunes, cooked	6 medium size	100	22			88	.022	.042	.0012			
Prunes, dry	4 medium size	40	29	1		120	.022	.042	.0012	++	++	—
Pumpkin, raw, E. P.	½ c.	100	5	1		24	.023	.059	.0008	+	+	+
Radishes, E. P.	5 medium	30	2			8	.006	.009	.0002	— to +	+	*
Raisins, seeded	¼ c.	30	23	1	1	105	.019	.040	.0006	—	+	—
Raspberries, red, fresh	¾ c.	100	13	1		56	.049	.052	.0006	*	*	++
Rhubarb, fresh	¾ c.	100	4			16	.044	.031	.0010	—	—	+
Rice, raw	3 T. (½ c. cooked, 135 gms.)	30	24	2		104	.003	.029	.0003	—	—	—
Romaine, lettuce	10 leaves	100	3	1		16	.045	.053	?	++	++	*
Rutabagas	¾ c.	100	9	1		40	.074	.056	?	— to +	++	+++?
Salsify (oyster plant)	⅔ c.	100	7	1		32	?	?	?			
Sauerkraut	¾ c.	100	4	1		20	.045	.029	.0011	+	+	—?
Shredded wheat	1 biscuit	30	23	3		104	.012	.097	.0014			
Shrimp, fresh	½ c.	90		23	1	101	.086	?	?	+	*	*
Sorrel (sour grass)	½ c.	100	3	1		16	?	?	?			
Soy bean meal	¼ c.	30	7	12	6	130	?	?	?	+	+++	*
Spaghetti, dry	⅓ c.	30	23	4		108	.007	.043	.0004	—	—	—
Spinach, cooked	½ c. (1½ c. raw)	100	3	2		20	.067	.068	.0036	+++	+++	+
Squash, summer, E. P.	½ c.	100	3	1		16	.018	?	.0006			
Squash, winter, E. P.	½ c.	100	9	1		40	.019	?	.0006	++	*	*
Starch, corn, dry	3 T.	30	27			108				—	—	—

TABLE V—*Continued*

Food Materials	*Approx. Measure Average Serving*	*Wt. Gms.*	*Coh. Gms.*	*Prot. Gms.*	*Fat Gms.*	*Cal.*	*Ca. Gm.*	*P. Gm.*	*Fe. Gm.*	*A*	*B*	*C*
Strawberries . . .	¾ c.	100	7	1		32	.041	.028	.0008	*	+	+ to ++
Sugar, brown . . .	2 T.	30	28			112				—	—	—
Sugar (milk), Lactose	2 T.	30	30			120				—	—	—
Sugar, white . . .	2 T.	30	30			120				—	—	—
Sweetbreads . . .	½ medium size .	50		8	6	86	.005	.086	.0012	+	+	*
Tapioca, dry . . .	3 T.	15	13			52	.003	.014	.0002	—	—	—
Tomatoes, canned .	½ c.	100	4	1		20	.011	.026	.0004	++	++	+++
Tomatoes, fresh . .	1 medium . . .	100	4	1		20	.011	.026	.0004	++	++	+++
Turnips, cooked . .	½ c.	100	7	1		32	.064	.046	.0005	— to +	++	++?
Turnip greens, cooked	½ c.	100	5	1		24	.347	.049	?			
Veal, chop, lean, E. P.	1 medium chop .	90		18	6	126	.010	.194	.0027	— to +	+?	*
Veal, roast, lean . .	2 slices 4½"x2½"x ⅛" . . .	50		11	4	80	.006	.118	.0017	— to +	+?	*
Walnut, English, shelled	7 nuts	30	4	6	19	211	.027	.107	.0006	+	++	*
Watercress . . .	10 pieces . . .	25	2			8	.047	.011	.0005			
Watermelon, E. P. .	1 piece 2½"x2"x1½"	100	7			28	.011	.003	?			
Wheat, Cream of . .	2 T. (½ c. cooked, 100 gms.) .	20	16	2		72	.004	.025	.0002			
Wheat, cracked, dry .	3 T.	30	23	3	1	113	.013	.127	.0015			
Wheatena	3 T.	30	23	3	1	113	.013	.127	.0015			
Wheat, puffed . .	5 heaping T. . .	15	11	2		52	.007	.063	.0007			
Yeast, compressed .	1 cake 1⅜"x1⅜"x½"	12	3	1		12	?	?	?	—	+++	—

TABLE VI

CHEMICAL COMPOSITION AND SALT CONTENT OF 100 GRAM PORTION OF FOOD MATERIALS.[1]

I. ANIMAL FOODS

A. Meats		*Protein* *gms.*	*Fat* *gms.*	*Carbo.* *gms.*	*Salt* *mgs.*	*Cal.*
1. Mutton, Lamb, Beef, or Veal	Free from visible fat	27	5	0	168	153
	Medium fat	25	10	0	155	190
	Fat	23	20	0	141	272
2. Pork—fresh	Free from visible fat	25	15	0	155	235
	Medium fat	20	20	0	123	260
	Fat	15	30	—	92	330
3. Chicken	Free from visible fat	25	3	0	155	127
	With skin and fat	24	15	—	148	231
4. Turkey, Goose	Free from visible fat	25	10	0	155	190
	With skin and fat	20	25	0	123	305

B. Fish—Salt Water	*Protein* *gms.*	*Fat* *gms.*	*Carbo.* *gms.*	*Salt* *mgs.*	*Cal.*
Sea Bass	23	1	0	199	101
Black Bass	24	2	0	207	114
Cod	23	1	0	199	101
Flounder or Sole	17	1	0	146	77
Haddock	20	1	0	173	89
Halibut	23	6	0	199	146
Herring	23	9	0	199	173
Mackerel	22	9	0	191	169
Salmon	25	15	0	218	235
Smelts	21	2	—	183	102

Fish—Fresh Water	*Protein* *gms.*	*Fat* *gms.*	*Carbo.* *gms.*	*Salt* *mgs.*	*Cal.*
Brook Trout	22	2	0	191	106
Lake Trout	21	12	0	183	192

II. DAIRY PRODUCTS

A. Cheese	*Protein* *gms.*	*Fat* *gms.*	*Carbo.* *gms.*	*Salt* *mgs.*	*Cal.*
Cottage	21	1	4	100	109

B. Cream	*Protein* *gms.*	*Fat* *gms.*	*Carbo.* *gms.*	*Salt* *mgs.*	*Cal.*
Table	3	18	4	132	195
Pastry	2	36	3	70	344

C. Milk	*Protein* *gms.*	*Fat* *gms.*	*Carbo.* *gms.*	*Salt* *mgs.*	*Cal.*
Whole Milk	3	4	5	175	68
Buttermilk	4	5	4	163	36
Condensed Milk	8	9	55	462	333

[1] Analysis compiled and used at the Stanford University Hospitals, San Francisco, Calif. Courtesy of Miss Charlotte Sloan.

D. Eggs	Protein gms.	Fat gms.	Carbo. gms.	Salt mgs.	Cal.
Eggs	12	12	0	175	156
Egg White	12	0	0	256	48
Egg Yolk	16	33	—	155	361

E. Fats	Protein gms.	Fat gms.	Carbo. gms.	Salt mgs.	Cal.
S. F. Butter	..	85	..	20	765
S. F. Mayonnaise	..	100	..	12	900
Oil	..	100	..	..	900

III. CEREALS

	Protein gms.	Fat gms.	Carbo. gms.	Salt mgs.	Cal.
Barley—pearled	9	1	78	26	357
Buckwheat	6	1	78	20	345
Cracked Wheat	11	2	74	110	358
Cream of Wheat	12	1	75	120	357
Farina	11	1	75	125	353
Graham Flour	13	2	71	110	354
Hominy	8	1	79	76	357
Macaroni	13	1	74	120	357
Matzos	15	0	70	120	340
Oatmeal	16	7	68	110	399
Puffed Rice	7	1	80	90	357
Puffed Wheat	11	1	75	120	353
Quaker Oats	17	7	66	82	395
Rye Flour	7	1	79	90	353
Rice	8	0	79	90	348
Shredded Wheat	8	1	76	112	345
Triscuit	11	1	75	112	352
Tapioca	—	—	88	30	352
Wheatena	11	3	76	125	375
White Bread—S. F.	7	2	50	76	246
White Flour	11	1	75	122	353
Whole Wheat	13	2	71	112	354
Whole Wheat—S. F.	7.5	2	50	60	246

IV. VEGETABLES

	Protein gms.	Fat gms.	Carbo. gms.	Salt mgs.	Cal.
Artichokes	1	0	..	36	4
Avocado	2	14	7	..	162
Asparagus	2	0	3	60	20
Beans—dry	22	2	59	52	342
Kidney—dry	22	1	65	67	357
Lima—dry	18	1	66	42	345
Lima—fresh	7	1	22	14	125
Lima—canned	4	0	13	40	68
String—fresh	1	0	4	40	20

	Protein gms.	Fat gms.	Carbo. gms.	Salt mgs.	Cal.
Beets	2	0	7	100	36
Brussels Sprouts	1	0	3	70	16
Cabbage	2	0	6	40	32
Carrots	1	0	6	60	28
Cauliflower	2	0	3	60	20
Celery—fresh	1	0	3	260	16
Celery—root	2	0	6	80	32
Corn	3	0	18	20	84
Cucumber—fresh	1	0	3	50	16
Chard	3	0	5	64	32
Eggplant	1	0	3	40	16
Endive	1	0	2	275	12
Horseradish—dried	11	..	18	26	116
Leeks	1	0	6	40	28
Lettuce—fresh	1	0	1	120	8
Mushrooms	..	..	..	34	..
Onions—fresh	2	0	9	34	44
Onions	2	..	5	34	28
Parsnips	2	0	11	50	52
Peas—fresh	6	..	15	40	84
Peas—dried	24	1	62	60	353
Pumpkin	1	0	5	..	24
Peppers—green	1	0	4	20	20
Potatoes—baked	3	0	25	60	112
Potatoes—boiled	3	0	21	60	96
Radishes	1	0	6	80	28
Spinach	2	0	3	120	20
Squash—hubbard	1	0	10	10	44
Squash—summer	0	0	6	10	24
Squash—vegetable marrow	1	0	3	10	16
quash—Italian	1	0	3	10	16
Tomatoes—fresh	1	0	4	60	20
Tomatoes—canned	1	0	4	60	20
Tomatoes—juice	0	0	0	90	..
Turnips	1	0	8	70	36
Water Cress	1	..	4	100	20

V. FRUITS—E. P.

	Protein gms.	Fat gms.	Carbo. gms.	Salt mgs.	Cal.
Apples—fresh	0	0	15	8	60
Apricots—fresh	1	0	13	3	56
Apricots—canned	1	0	17	3	72
Bananas—yellow	1	0	20	206	84
Blackberries—fresh	1	0	8	20	36
Blackberries—canned	0	2	56	20	242
Cantaloupe	1	..	10	70	44
Cherries—fresh	1	0	17	23	72
Cherries—canned	1	0	21	23	88

	Protein gms.	Fat gms.	Carbo. gms.	Salt mgs.	Cal.
Cocoanut—fresh	6	51	28	210	595
Cocoanut—dried	6	57	31	410	661
Currants—dried	2	2	74	99	318
Currants—fresh	1	..	13	9	56
Dates	2	3	78	376	347
Figs—fresh	1	0	19	20	80
Figs—dried	4	0	74	70	315
Grapefruit	0	0	7	8	28
Grapes	1	2	15	10	82
Grape Juice	0	0	15	3	60
Lemons	1	0	7	3	32
Lemon Juice	0	0	10	5	40
Muskmelon	1	0	10	30	44
Orange	1	0	12	10	52
Orange Juice	0	0	14	10	56
Peaches—fresh	0	0	9	10	36
Peaches—canned	0	0	11	10	44
Pears—fresh	0	0	14	20	56
Pears—canned	0	0	18	20	72
Pineapple—fresh	0	0	12	80	48
Pineapple—canned	..	..	36	80	144
Rhubarb	1	..	3	60	16
Strawberries—fresh	1	..	7	10	32
Strawberries—canned	1	..	24	10	96
Watermelon	..	..	7	10	28

Dried Fruits	Protein gms.	Fat gms.	Carbo. gms.	Salt mgs.	Cal.
Apples	2	2	66	40	290
Apricots	5	1	63	14	281
Citron	1	2	78	4	334
Currants	2	2	74	99	322
Raisins	3	3	76	135	343

VI. NUTS

	Protein gms.	Fat gms.	Carbo. gms.	Salt mgs.	Cal.
Almonds	21	55	17	60	647
Chestnuts	6	5	42	10	237
Pecans	10	70	15	80	730
Peanuts	26	39	24	90	533
Walnuts	17	63	16	70	699

VII. SUGARS, JAMS, AND CONDIMENTS

	Protein gms.	Fat gms.	Carbo. gms.	Salt mgs.	Cal.
Chocolate (Ghirardelli Ground, Sweet)	8	15	68	80	439
Breakfast Cocoa	18	26	38	84	458
Unsweetened Chocolate	10	54	25	84	626

	Protein gms.	*Fat gms.*	*Carbo. gms.*	*Salt mgs.*	*Cal.*
Cinnamon	..	..	..	60	..
Honey	..	..	81	47	324
Jams and Jellies	..	..	85	20	340
Molasses	2	..	69	523	284
Mustard	..	..	..	26	..
Pepper					
Black—dry	..	..	..	514	..
White—dry	..	..	..	47	..
Paprika	..	..	..	255	..
Vanilla	..	..	..	60	..

TABLE VII [1]

ASH CONSTITUENTS OF FOODS IN PERCENTAGE OF THE EDIBLE PORTION
(Compiled from various sources)

Food	*Calcium (Ca)*	*Magnesium (Mg)*	*Potassium (K)*	*Sodium (Na)*	*Phosphorus (P)*	*Chlorine (Cl)*	*Sulphur (S)*	*Iron (Fe)*
Almonds . .	.239	.251	.741	.019	.465	.037	.160	.0039
Apples . . .	.007	.008	.127	.011	.012	.005	.006	.0003
dried . . .	.032	.037	(.623)	(.050)	.048	(.025)	?	(.0015)
Apricots . .	.014	.010	.248	.038	.025	.002	.010	(.0003)
dried . . .	(.066)	(.047)	(1.157)	(.177)	(.117)	(.009)	?	(.0014)
Asparagus . .	.025	.011	.196	.007	.039	.039	.041	.0010
Bacon (See Meat)								
Bananas . .	.009	.028	.401	.034	.031	.125	.010	.0006
Barley, entire .	.043	.141	.477	.076	.400	.016	.153	.0041
pearled . .	.020	(.070)	(.241)	(.037)	.181	(.016)	(.120)	(.0020)
Beans, dried .	.160	.156	1.229	.097	.471	.032	.215	.0070
kidney, dry .	.132	.139	1.144	.041	.475	.041	.227	.0072
Lima, dry .	.071	.188	1.741	.249	.338	.026	.161	.0070
Lima, fresh .	.028	(.070)	(.613)	(.088)	.133	(.009)	(.057)	.0020
string, fresh	.046	.025	.247	.019	.052	.024	.030	.0011
Beef (See Meat)								
Beer . . .	.004	.008	.058	.013	.028	.006	.015	.0001
Beets . . .	.029	.021	.353	.093	.039	.058	.016	.0006
Blackberries .	.017	.021	.169	(.007)	.034	(.010)	.020	.0006
Blood (avg.) .	.008	.004	.075	.261	.031	.280	.137	.0526
Blueberries .	.020	.007	.051	.016	.008	.008	.011	.0009
Bluefish (See Fish)								
Bread,								
Boston brown	.129	.078	(.232)	(.394)	.185	(.607)	.201	(.0030)
entire wheat	(.05)	(.05)	(.208)	(.394)	(.175)	(.607)	(.120)	(.0016)
graham . .	(.05)	(.05)	(.291)	(.394)	(.218)	(.607)	.150	(.0025)
rye . . .	.024	.039	.151	.701	.148	1.025	.104	(.0016)
white . .	.027	.023	.108	(.394)	.093	(.607)	.105	.0009
Breadfruit . .	.084	.007	.235	.027	.068	.100	.049	
Brussels sprouts	.027	.040	.375	.004	.120	.040	.194	(.0011)
Buckwheat flour	.039	.048	.130	.027	.226	.012	.071	.0012
Butter . . .	.015	.001	.014	(.788)	.017	(1.212)	(.010)	.0002
Buttermilk .	.105	.016	.151	.064	.097	.099	.026	.00025
Cabbage . .	.045	.015	.247	.027	.029	.024	.066	.0011
Cabbage greens	.106	.030	.512	.025	.099	.068	.173	.0018
Cantaloupe .	.017	.012	.235	.061	.015	.041	.014	.0003
Capers . . .	.122	.022	.209	.051	.062	—	—	—
Carp (See Fish)								
Carrots . .	.056	.021	.287	.101	.046	.036	.022	.0006
Cauliflower .	.123	.014	.222	.068	.061	.050	.086	.0006
Caviar . . .	.137	.022	.422	.874	.176	1.819	—	—

[1] From Sherman's "Chemistry of Food and Nutrition," by courtesy of the author.

TABLE VII—*Continued*

Food	*Calcium (Ca)*	*Magnesium (Mg)*	*Potassium (K)*	*Sodium (Na)*	*Phosphorus (P)*	*Chlorine (Cl)*	*Sulphur (S)*	*Iron (Fe)*
Celery	.078	.014	.316	.084	.037	.156	.022	.0005
Chard	.150	.071	.318	.086	.040	.039	.124	(.0025)
Cheese	.931	.037	.089	.606	.683	.880	.263	.0013
Cherries	.019	.016	.213	.023	.031	.014	.011	.0004
Cherry juice	.017	.011	.200	.013	.018	.003	.006	(.0003)
Chestnuts	.034	.051	.560	.065	.093	.006	.068	.0007
Chicken (See Meat)								
Chocolate	.092	(.293)	(.563)	.012	.455	(.051)	.085	(.0027)
Cider	.008	.011	.095	.020	.009	.006	.006	(.0002)
Citron	.121	.018	.210	.011	.033	.003	.020	—
Clams, round	.106	.098	.131	.705	.046	1.220	.224	—
soft, long	.124	.079	.212	.500	.122	.910	.213	—
Cocoa	.112	.420	.900	.059	.709	.051	.203	.0027
Coconut, dried	.059	.059	.597	.073	.155	.239	(.056)	—
fresh	.024	.020	.300	.036	.074	.120	.028	—
Coconut milk	.020	.009	.144	—	.010	—	.008	—
Cod (See Fish)								
Corn (maize), mature	.020	.121	.339	.036	.283	.045	.151	.0029
meal	.018	.084	.213	.039	.190	.146	.111	.0009
sweet	.006	.033	.113	.040	.103	.014	.046	.0008
sweet, dried	.021	.121	.414	.146	.376	.050	.167	.0029
Cotton-seed meal	.265	.462	1.390	.234	1.193	.037	.485	—
Cowpeas	.100	.208	1.402	.161	.456	.040	.240	—
Crackers	.022	.011	.100	(.594)	.102	(.910)	.125	.0015
Cranberries	.018	.007	.077	.010	.013	.009	.007	.0006
Cream	.086	.010	.126	.035	.067	.080	.030	.00022
Cucumbers	.016	.009	.140	.010	.033	.030	.020	.0002
Currants, dried	.082	.044	.873	.081	.195	.060	.044	(.0025)
fresh	.026	.017	.211	.007	.038	.006	.014	.0005
Currant juice	.021	.010	.185	(.006)	.018	.004	.005	—
Dandelion	.105	.036	.461	.168	.072	.099	.017	.0027
Dates	.065	.069	.611	.055	.056	.228	.070	.0030
Duck (See Meat)								
Eggplant	.011	.015	(.140)	(.010)	.034	.024	.016	.0005
Eggs	.067	.011	.140	.143	.180	.106	.195	.0030
Egg white	.015	.010	.160	.156	.014	.155	.216	.0001
Egg yolk	.137	.016	.115	.075	.524	.094	.166	.0086
Endive	.104	.013	.380	.109	.038	.167	.035	—
Farina	.021	.025	.120	.065	.125	.076	.155	.0008
Figs, dried	.162	.071	.964	.046	.116	.043	.056	.0030
fresh	.053	.022	.303	.012	.036	.014	.010	—
Fish *								

* Average fish is estimated to contain *per 100 grams of protein* as follows: 0.109 gram Ca; 0.133 gram Mg; 1.671 grams K; 0.373 gram Na; 1.148 grams P; 0.528 gram Cl; 1.119 grams S; 0.0055 gram Fe.

TABLE VII—*Continued*

Food	*Calcium (Ca)*	*Magnesium (Mg)*	*Potassium (K)*	*Sodium (Na)*	*Phosphorus (P)*	*Chlorine (Cl)*	*Sulphur (S)*	*Iron (Fe)*
Flaxseed . .	.204	.252	.901	.050	.627	.022	.170	—
Flour,								
buckwheat .	.010	.048	.130	.027	.176	.012	.071	.0012
entire wheat	.031	(.090)	(.274)	(.037)	.238	(.070)	(.180)	.0025
graham . .	.039	(.133)	(.457)	(.037)	.364	(.070)	.183	.0037
white . .	.020	.018	.115	.060	.092	.074	.177	.0010
rye . . .	.018	.081	.463	.019	.289	.055	.123	.0013
Fowl (See Meat)								
Gluten feed .	.247	.221	.250	.420	.542	.090	.558	—
Goose (See Meat)								
Gooseberries .	.035	.014	.197	.038	.031	—	.011	.0005
Grapefruit . .	.021	.009	.161	.004	.020	.005	.010	.0003
Grape juice .	.011	.009	.106	.005	.011	.002	.009	.0003
Grapes . . .	.019	.010	.197	.015	.031	.005	.024	.0003
Guava . . .	.014	.008	.384	—	.030	.045	—	—
Haddock (See Fish)								
Halibut (See Fish)								
Ham (See Meat)								
Hazelnuts . .	.287	.140	.618	.019	.354	.067	.198	.0041
Herring (See Fish)								
Hominy . .	.011	.058	.174	.020	.144	.046	(.136)	(.0009)
Honey . . .	.004	.018	.386	.001	.019	.029	.001	.0007
Horseradish .	.096	.039	.468	.062	.076	.016	.190	—
Huckleberries .	.020	.007	.051	.016	.008	.008	.011	.0009
Huckleberry wine . . .	.009	.004	.042	.006	.004	.001	.006	—
Jam *								
Jelly . . .	.014	(.010)	(.100)	(.013)	.008	(.004)	(.007)	(.0003)
Kohl-rabi . .	.077	.030	.370	.050	.071	.053	.057	.0006
Lamb (See Meat)								
Leeks . . .	.058	.014	.199	.081	.006	.024	.072	—
Lemons . .	.036	.007	.175	.004	.022	.002	.011	.0006
Lemon juice .	.024	.010	.127	.009	.010	.003	.006	—
Lemon, sweet .	.030	.006	.442	—	.042	.013	.016	—
Lentils, dry .	.107	.101	.877	.062	.438	.050	.277	.0086
Lettuce . .	.043	.017	.339	.027	.042	.074	.014	.0007
Limes . . .	.055	.014	.350	.062	.036	.039	.010	—
Lime juice . .	—	—	—	—	—	—	.003	—
Linseed meal .	.413	.432	1.083	.251	.741	.085	.396	—
Lupins, dry .	.191	.191	.840	.073	.520	.034	—	—

* The percentages of the ash constituents in jams are believed to average about two thirds those of the corresponding fruits.

TABLE VII—*Continued*

Food	*Calcium (Ca)*	*Magnesium (Mg)*	*Potassium (K)*	*Sodium (Na)*	*Phosphorus (P)*	*Chlorine (Cl)*	*Sulphur (S)*	*Iron (Fe)*
Macaroni . .	.022	.037	.130	.008	.144	.073	.172	.0012
Mackerel (See Fish)								
Mamey . . .	.009	.012	.345	—	.028	.140	—	—
Mango . . .	.021	.007	.235	—	.017	.019	.013	—
Mangolds . .	.026	.030	.334	.071	.038	.082	.026	—
Maple syrup .	.107	.034	.208	.010	.013	(.010)	(.005)	(.003)
Meat †								
Meat extract, solid . . .	.085	.363	7.347	2.394	2.800	3.117	—	—
Meat peptone .	.025	.124	2.440	.641	1.130	.561	.222	—
Milk (cow's), whole . .	.120	.012	.143	.051	.093	.106	.034	.00024
skimmed . .	(.122)	(.012)	(.149)	(.052)	(.096)	(.110)	(.035)	.00025
condensed .	(.300)	(.032)	(.374)	(.134)	.235	(.280)	(.090)	.0006
buffalo . .	.203	.016	.099	.038	.125	.062	—	—
camel's . .	.143	.021	.114	.019	.098	.105	—	—
goat's . .	.128	.013	.145	.079	.103	.014	.037	—
human . .	.034	.005	.047	.010	.015	.035	—	—
mare's . .	.083	.007	.081	.010	.054	.029	—	—
sheep's . .	.207	.008	.187	.030	.123	.071	—	—
Millet . . .	.014	.167	.290	.085	.327	.019	—	—
Molasses . .	.211	.068	1.349	.019	.044	.317	.129	.0073
Mushrooms .	.017	.016	.384	.027	.108	.021	.051	—
Muskmelon .	.017	.012	.235	.061	.015	.041	.014	.0003
Mustard . .	.492	.260	.761	.056	.755	.016	1.230	—
Mutton (See Meat)								
Oatmeal . .	.069	.110	.344	.062	.392	.069	.202	.0038
Okra . . .	.071	.010	.035	.043	.019	—	—	—
Olives . . .	.122	.002	1.526	.128	.014	.004	.027	.0029
Onions . . .	.034	.016	.178	.016	.045	.021	.070	.0006
Oranges . .	.045	.012	.177	.012	.021	.006	.011	.0002
Orange juice .	.029	.011	.182	.008	.016	.003	.009	.0002
Oysters . .	.052	.037	.091	.459	.155	.590	.187	.0045
Paprika . .	.229	.164	2.075	.178	.341	.155	—	—
Parsnips . .	.059	.034	.518	.004	.076	.030	.036	.0006
Peaches . .	.016	.010	.214	.022	.024	.004	.009	.0003
dried . . .	.034	.056	(.830)	.082	.146	—	.212	(.0012)
Peanuts . .	.071	.180	.654	.050	.399	.056	.224	.0020
Pears . . .	.015	.011	.132	.016	.026	.011	.010	.0003
Pear juice . .	.009	.008	1.40	—	.011	—	.009	—
Peas, dried . .	.084	.149	.903	.104	.400	.035	.219	.0057
fresh . . .	.028	.038	.285	.013	.127	.024	.063	.0017
Pecan nuts .	.089	.152	(.332)	—	.335	.050	.113	.0026

† Average meat is estimated to contain *per 100 grams protein* as follows: 0.058 gram Ca; 0.118 gram Mg; 1.694 grams K; 0.421 gram Na; 1.078 grams P; 0.378 gram Cl; 1.146 grams S; 0.0150 gram Fe.

TABLE VII—*Continued*

Food	*Calcium (Ca)*	*Magnesium (Mg)*	*Potassium (K)*	*Sodium (Na)*	*Phosphorus (P)*	*Chlorine (Cl)*	*Sulphur (S)*	*Iron (Fe)*
Pepper, green, fresh	.006	.010	(.139)	—	.026	.013	.014	.0004
Pepper, black, dry	.440	.156	1.140	.131	.188	.312	—	—
Pepper, white, dry	.425	.113	—	—	.233	.029	—	—
Perch (See Fish)								
Persimmons	.022	.009	.292	.011	.021	.002	.005	—
Pineapple	.018	.011	.321	.016	.028	.051	.009	.0005
Plums	.020	.011	.203	.019	.032	.002	.009	.0005
Pomegranate	.011	.005	.063	.085	.105	.003	—	.0004
Pork (See Meat)								
Potatoes	.014	.028	.429	.021	.058	.038	.030	.0013
sweet	.019	.028	.397	.039	.045	.094	.024	.0005
Prunes, dried	.054	.055	1.030	.069	.105	.017	.037	.0030
Pumpkin	.023	.008	(.320)	.065	.059	—	.021	(.0008)
Radishes	.021	.012	.218	.069	.029	.054	.041	.0006
Raisins	.064	.083	.820	.133	.132	.082	.051	.0021
Raspberries	.049	.024	.173	—	.052	—	.017	.0006
Raspberry juice	.021	.016	.134	.005	.012	—	.009	—
Rhubarb	.044	.017	.325	.025	.031	.036	.013	.0010
Rice, brown	—	—	—	—	.207	—	—	.0020
white	.009	.033	.070	.025	.096	.054	.117	.0009
Romaine (salad)	.045	.032	.306	.016	.053	.073	.019	—
Rutabagas	.074	.018	.399	.083	.056	.058	.083	—
Rye, entire (See also Bread and Flour)	.055	.130	.453	.035	.385	.025	.170	.0039
Salmon (See Fish)								
Sapato	.026	.008	.179	—	.006	.087	—	—
Shredded wheat	.041	.144	—	—	.324	—	—	.0045
Shrimp	.096	—	—	—	—	—	—	—
Soup, canned	.036	—	.033	—	.030	—	—	—
canned vegetable	.025	.013	.101	—	.038	—	.025	—
Spinach	.067	.037	.774	.125	.068	.074	.038	.0036
Squash, summer, seeds removed	.018	.008	.150	.002	—	—	—	(.0006)
with seeds	.024	.012	.180	.004	—	—	—	(.0006)
Squash, winter	.019	.011	.320	.004	—	—	—	(.0006)
Strawberries	.041	.019	.147	.050	.028	.006	.014	.0008
Tamarind	.007	.021	—	—	.072	.007	.009	—

TABLE VII—*Continued*

Food	*Calcium (Ca)*	*Magnesium (Mg)*	*Potassium (K)*	*Sodium (Na)*	*Phosphorus (P)*	*Chlorine (Cl)*	*Sulphur (S)*	*Iron (Fe)*
Tapioca . .	.023	—	—	—	.090	.018	.029	.0016
Tomatoes . .	.011	.010	.275	.010	.026	.034	.014	.0004
Tomato juice .	.006	.010	.310	.015	.015	.055	—	—
Truffles . . .	.024	.018	.404	.077	.062	.039	—	—
Turnips . .	.064	.017	.338	.056	.046	.041	.065	.0005
Turnip tops .	.347	.028	.307	.082	.049	.168	.069	—
Veal (See Meat)								
Vinegar (cider)	.016	.008	.165	—	.013	—	.017	(.0003)
Walnuts . .	.089	.134	(.332)	—	.358	.040	.172	.0021
Water cress .	.187 ?	.034	.287	.099	.005	.061	.167	.0019
Watermelon .	.011	.003	.073	.008	.003	.008	.007	—
Wheat, entire . (See also Bread and Flour)	.045	.133	.473	.039	.423	.068	.181	.0050
Wheat bran .	.120	.511	1.217	.154	1.215	.090	.247	.0078
Wheat germ .	.071	.342	.296	.722	1.050	.070	.325	—
Wheat gluten .	.078	.045	.007	.028	2.00	.050	.920	—
Whey . . .	.044	.008	.157	.038	.035	.119	.009	?
Whortleberries, entire . .	.031	.021	.261	.021	.042	—	—	—
flesh only .	.020	.011	.087	—	.018	—	—	—
Wine (avg.) .	.009	.010	.104	.008	.015	.011	.015	(.0003)

Standard Table of Heights and Weights *

Light-face Figures are 20 Percent. Under and Over the Average

MEN

Heights		*Weights According to Age Period*								
Ft.	In.	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59
4	11	89	94	98	100	102	104	106	106	107
		111	**117**	**122**	**125**	**127**	**130**	**132**	**133**	**134**
		133	140	146	150	152	156	158	160	161
5	0	90	95	99	102	103	106	107	108	109
		113	**119**	**124**	**127**	**129**	**132**	**134**	**135**	**136**
		136	143	149	152	155	158	161	162	163
	1	92	97	101	103	105	107	109	110	110
		115	**121**	**126**	**129**	**131**	**134**	**136**	**137**	**138**
		138	145	151	155	157	161	163	164	166
	2	94	99	102	105	106	109	110	111	112
		118	**124**	**128**	**131**	**133**	**136**	**138**	**139**	**140**
		142	149	154	157	160	163	166	167	168
	3	97	102	105	107	109	111	113	114	114
		121	**127**	**131**	**134**	**136**	**139**	**141**	**142**	**143**
		145	152	157	161	163	167	169	170	172
	4	99	105	107	110	112	114	115	116	117
		124	**131**	**134**	**137**	**140**	**142**	**144**	**145**	**146**
		149	157	161	164	168	170	173	174	175
	5	102	108	110	113	115	117	118	119	120
		128	**135**	**138**	**141**	**144**	**146**	**148**	**149**	**150**
		154	162	166	169	173	175	178	179	180
	6	106	111	114	116	118	120	122	122	123
		132	**139**	**142**	**145**	**148**	**150**	**152**	**153**	**154**
		158	167	170	174	178	180	182	184	185
	7	109	114	117	119	122	123	125	126	126
		136	**142**	**146**	**149**	**152**	**154**	**156**	**157**	**158**
		163	170	175	179	182	185	187	188	190
	8	112	117	120	123	126	127	129	130	130
		140	**146**	**150**	**154**	**157**	**159**	**161**	**162**	**163**
		168	175	180	185	188	191	193	194	196
	9	115	120	123	126	130	131	133	134	134
		144	**150**	**154**	**158**	**162**	**164**	**166**	**167**	**168**
		173	180	185	190	194	197	199	200	202
	10	118	123	126	130	134	135	137	138	138
		148	**154**	**158**	**163**	**167**	**169**	**171**	**172**	**173**
		178	185	190	196	200	203	205	206	208
	11	122	126	130	134	138	140	142	142	143
		153	**158**	**163**	**168**	**172**	**175**	**177**	**178**	**179**
		184	190	196	202	206	210	212	214	215
6	0	126	130	135	139	142	145	146	147	148
		158	**163**	**169**	**174**	**178**	**181**	**183**	**184**	**185**
		190	196	203	209	214	217	220	221	222
	1	130	134	140	144	147	150	152	153	154
		163	**168**	**175**	**180**	**184**	**187**	**190**	**191**	**192**
		196	202	210	216	221	224	228	229	230
	2	134	138	145	149	153	155	158	158	159
		168	**173**	**181**	**186**	**191**	**194**	**197**	**198**	**199**
		202	208	217	223	229	233	236	238	239
	3	138	142	150	154	158	161	163	164	165
		173	**178**	**187**	**192**	**197**	**201**	**204**	**205**	**206**
		208	214	224	230	236	241	245	246	247

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* Courtesy of Metropolitan Life Insurance Co.

Standard Table of Heights and Weights

Light-face Figures are 20 Percent. Under and Over the Average

WOMEN

Heights		Weights According to Age Period								
Ft.	In.	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59
4	11	88	90	93	95	98	101	103	105	106
		110	**113**	**116**	**119**	**122**	**126**	**129**	**131**	**132**
		132	136	139	143	146	151	155	157	158
5	0	90	92	94	97	99	102	105	106	107
		112	**115**	**118**	**121**	**124**	**128**	**131**	**133**	**134**
		134	138	142	145	149	154	157	160	161
	1	91	94	96	98	101	104	106	108	110
		114	**117**	**120**	**123**	**126**	**130**	**133**	**135**	**137**
		137	140	144	148	151	156	160	162	164
	2	94	96	98	100	103	106	109	110	112
		117	**120**	**122**	**125**	**129**	**133**	**136**	**138**	**140**
		140	144	146	150	155	160	163	166	168
	3	96	98	100	102	106	109	111	113	114
		120	**123**	**125**	**128**	**132**	**136**	**139**	**141**	**143**
		144	148	150	154	158	163	167	169	172
	4	98	101	103	106	109	111	114	115	117
		123	**126**	**129**	**132**	**136**	**139**	**142**	**144**	**146**
		148	151	155	158	163	167	170	173	175
	5	101	103	106	109	112	114	117	118	120
		126	**129**	**132**	**136**	**140**	**143**	**146**	**148**	**150**
		151	155	158	163	168	172	175	178	180
	6	104	106	109	112	115	118	121	122	122
		130	**133**	**136**	**140**	**144**	**147**	**151**	**152**	**153**
		156	160	163	168	173	176	181	182	184
	7	107	110	112	115	118	121	124	126	126
		134	**137**	**140**	**144**	**148**	**151**	**155**	**157**	**158**
		161	164	168	173	178	181	186	188	190
	8	110	113	115	118	122	124	127	130	130
		138	**141**	**144**	**148**	**152**	**155**	**159**	**162**	**163**
		166	169	173	178	182	186	191	194	196
	9	113	116	118	122	125	127	130	133	134
		141	**145**	**148**	**152**	**156**	**159**	**163**	**166**	**167**
		169	174	178	182	187	191	196	199	200
	10	116	119	122	124	127	130	133	136	138
		145	**149**	**152**	**155**	**159**	**162**	**166**	**170**	**173**
		174	179	182	186	191	194	199	204	208
	11	120	122	124	126	130	133	136	139	142
		150	**153**	**155**	**158**	**162**	**166**	**170**	**174**	**177**
		180	184	186	190	194	199	204	209	212
6	0	124	126	127	130	132	135	138	142	146
		155	**157**	**159**	**162**	**165**	**169**	**173**	**177**	**182**
		186	188	191	194	198	203	208	212	218

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HEIGHTS AND WEIGHTS FOR CHILDREN UNDER FIVE YEARS OF AGE
(Based on Data Published by the Children's Bureau, U. S. Department of Labor)

Age	Boys		Girls	
	Height Inches	*Weight Pounds*	*Height Inches*	*Weight Pounds*
Birth . .	20.6	7.6	20.5	7.2
3 mo. . . .	23.5	13.0	—	—
6 mo. . . .	26.5	18.0	25.9	16.8
9 mo. . . .	28.1	20.4	26.6	19.1
12 mo. . . .	29.4	21.9	28.9	20.8
15 mo. . . .	30.8	23.6	30.1	21.9
18 mo. . . .	31.8	24.6	31.1	23.4
21 mo. . . .	32.9	25.8	32.3	24.8
24 mo. . . .	33.8	27.1	33.4	26.4
27 mo. . . .	34.8	29.0	33.9	27.3
30 mo. . . .	35.4	29.5	34.9	28.3
33 mo. . . .	36.1	30.6	35.6	29.1
36 mo. . . .	37.1	32.3	36.8	30.5
39 mo. . . .	37.9	33.1	37.3	31.6
42 mo. . . .	38.6	33.8	38.0	32.5
45 mo. . . .	39.0	34.5	38.5	33.3
48 mo. . . .	39.5	35.9	39.0	33.8
5 years . .	41.6	41.1	41.3	39.7

According to Baldwin "Normal growth in weight and height is probably the best index for good health and good nutrition in childhood."

Height and Weight Table for Boys

Height Inches	5 Yrs.	6 Yrs.	7 Yrs.	8 Yrs.	9 Yrs.	10 Yrs.	11 Yrs.	12 Yrs.	13 Yrs.	14 Yrs.	15 Yrs.	16 Yrs.	17 Yrs.	18 Yrs.
39	35	36	37	....	....	....	....	....	....	....	....	....	....	....
40	37	38	39	....	....	....	....	....	....	....	....	....	....	....
41	39	40	41	....	....	....	....	....	....	....	....	....	....	....
42	41	42	43	44	....	....	....	....	....	....	....	....	....	....
43	43	44	45	46	....	....	....	....	....	....	....	....	....	....
44	45	46	46	47	....	....	....	....	....	....	....	....	....	....
45	47	47	48	48	49	....	....	....	....	....	....	....	....	....
46	48	49	50	50	51	....	....	....	....	....	....	....	....	....
47	....	51	52	52	53	54	....	....	....	....	....	....	....	....
48	....	53	54	55	55	56	57	....	....	....	....	....	....	....
49	....	55	56	57	58	58	59	....	....	....	....	....	....	....
50	....	....	58	59	60	60	61	62	....	....	....	....	....	....
51	....	....	60	61	62	63	64	65	....	....	....	....	....	....
52	....	....	62	63	64	65	67	68	....	....	....	....	....	....
53	....	....	....	66	67	68	69	70	71	....	....	....	....	....
54	....	....	....	69	70	71	72	73	74	....	....	....	....	....
55	....	....	....	....	73	74	75	76	77	78	....	....	....	....
56	....	....	....	....	77	78	79	80	81	82	....	....	....	....
57	....	....	....	....	....	81	82	83	84	85	86	....	....	....
58	....	....	....	....	....	84	85	86	87	88	90	91	....	....
59	....	....	....	....	....	87	88	89	90	92	94	96	97	....
60	....	....	....	....	....	91	92	93	94	97	99	101	102	....
61	....	....	....	....	....	....	95	97	99	102	104	106	108	110
62	....	....	....	....	....	....	100	102	104	106	109	111	113	116
63	....	....	....	....	....	....	105	107	109	111	114	115	117	119
64	....	....	....	....	....	....	....	113	115	117	118	119	120	122
65	....	....	....	....	....	....	....	....	120	122	123	124	125	126
66	....	....	....	....	....	....	....	....	125	126	127	128	129	130
67	....	....	....	....	....	....	....	....	130	130	132	133	134	135
68	....	....	....	....	....	....	....	....	134	135	136	137	138	139
69	....	....	....	....	....	....	....	....	138	139	140	141	142	143
70	....	....	....	....	....	....	....	....	....	142	144	145	146	147
71	....	....	....	....	....	....	....	....	....	147	149	150	151	152
72	....	....	....	....	....	....	....	....	....	152	154	155	156	157
73	....	....	....	....	....	....	....	....	....	157	159	160	161	162
74	....	....	....	....	....	....	....	....	....	162	164	165	166	167
75	....	....	....	....	....	....	....	....	....	....	169	170	171	172
76	....	....	....	....	....	....	....	....	....	....	174	175	176	177

Prepared by Dr. Thomas D. Wood.

Rate of Growth for Boys of Different Builds During School Age *

Age—Year	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Aver. Height (in.)														
Short	43	45	47	49	51	53	54	56	58	60	62	64	65	65
Medium	46	48	50	52	54	56	58	60	63	65	67	68	69	69
Tall	49	51	53	55	57	59	61	64	67	70	72	72	73	73
Aver. Annual Gain in Weight (Lbs.)														
Short	3	4	5	5	5	4	8	9	11	14	13	7	3	
Medium	4	5	6	6	6	7	9	11	15	11	8	4	3	
Tall	5	7	7	7	7	8	12	16	11	9	7	3	4	

* Taken from the Baldwin-Wood Weight-Height-Age Tables for Boys and Girls of School Age, published by the American Child Health Association.

Measurements are taken in indoor clothes without shoes, sweaters or coats. Age is taken at nearest birthday. Height at nearest inch; and Weight at nearest pound.

Courtesy of Child Health Organization of America.

Height and Weight Table for Girls

Height Inches	*5 Yrs.*	*6 Yrs.*	*7 Yrs.*	*8 Yrs.*	*9 Yrs.*	*10 Yrs.*	*11 Yrs.*	*12 Yrs.*	*13 Yrs.*	*14 Yrs.*	*15 Yrs.*	*16 Yrs.*	*17 Yrs.*	*18 Yrs.*
39	34	35	36	....	....	....	....	....	....	....	....	....	....	....
40	36	37	38	....	....	....	....	....	....	....	....	....	....	....
41	38	39	40	....	....	....	....	....	....	....	....	....	....	....
42	40	41	42	43	....	....	....	....	....	....	....	....	....	....
43	42	42	43	44	....	....	....	....	....	....	....	....	....	....
44	44	45	45	46	....	....	....	....	....	....	....	....	....	....
45	46	47	47	48	49	....	....	....	....	....	....	....	....	....
46	48	48	49	50	51	....	....	....	....	....	....	....	....	....
47	....	49	50	51	52	53	....	....	....	....	....	....	....	....
48	....	51	52	53	54	55	56	....	....	....	....	....	....	....
49	....	53	54	55	56	57	58	....	....	....	....	....	....	....
50	....	....	56	57	58	59	60	61	....	....	....	....	....	....
51	....	....	59	60	61	62	63	64	....	....	....	....	....	....
52	....	....	62	63	64	65	66	67	....	....	....	....	....	....
53	....	....	....	66	67	68	68	69	70	....	....	....	....	....
54	....	....	....	68	69	70	71	72	73	....	....	....	....	....
55	....	....	....	....	72	73	74	75	76	77	....	....	....	....
56	....	....	....	....	76	77	78	79	80	81	....	....	....	....
57	....	....	....	....	....	81	82	83	84	85	86	....	....	....
58	....	....	....	....	....	85	86	87	88	89	90	91	....	....
59	....	....	....	....	....	89	90	91	93	94	95	96	98	....
60	....	....	....	....	....	....	94	95	97	99	100	102	104	106
61	....	....	....	....	....	....	99	101	102	104	106	108	109	111
62	....	....	....	....	....	....	104	106	107	109	111	113	114	115
63	....	....	....	....	....	....	109	111	112	113	115	117	118	119
64	....	....	....	....	....	....	....	115	117	118	119	120	121	122
65	....	....	....	....	....	....	....	117	119	120	122	123	124	125
66	....	....	....	....	....	....	....	119	121	122	124	126	127	128
67	....	....	....	....	....	....	....	....	124	126	127	128	129	130
68	....	....	....	....	....	....	....	....	126	128	130	132	133	134
69	....	....	....	....	....	....	....	....	129	131	133	135	136	137
70	....	....	....	....	....	....	....	....	....	134	136	138	139	140
71	....	....	....	....	....	....	....	....	....	138	140	142	143	144
72	....	....	....	....	....	....	....	....	....	....	145	147	148	149

Prepared by Dr. Thomas D. Wood.

Rate of Growth for Girls of Different Builds During School Age *

Age—Year	6	7	8	9	10	11	12	13	14	15	16	17	18
Aver. Height (in.)													
Short	43	45	47	49	50	52	54	57	59	60	61	61	61
Medium	45	47	50	52	54	56	58	60	62	63	64	64	64
Tall	47	50	53	55	57	59	62	64	66	66	67	67	67
Aver. Annual Gain in Weight (Lbs.)													
Short	4	4	4	5	6	6	10	13	10	7	2	1	
Medium	5	5	6	7	8	10	13	10	6	4	3	1	
Tall	6	8	8	9	11	13	9	8	4	4	1	1	

* Taken from the Baldwin-Wood Weight-Height-Age Tables for Boys and Girls of School Age, published by the American Child Health Association.

Measurements are taken in indoor clothes without shoes, sweaters or coats. Age is taken at nearest birthday. Height at nearest inch; and Weight at nearest pound.

Courtesy of Child Health Organization of America.

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